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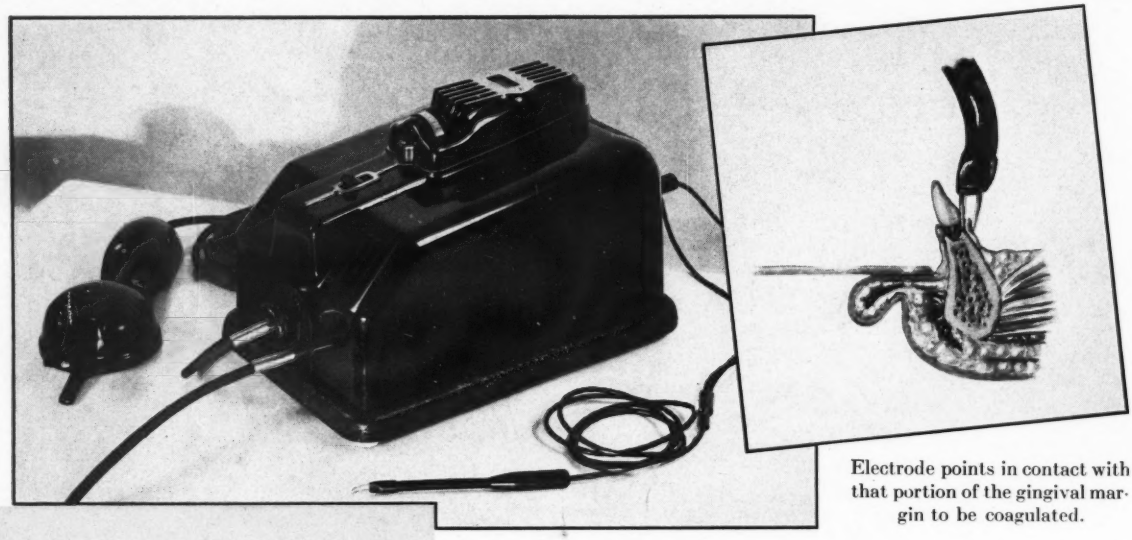

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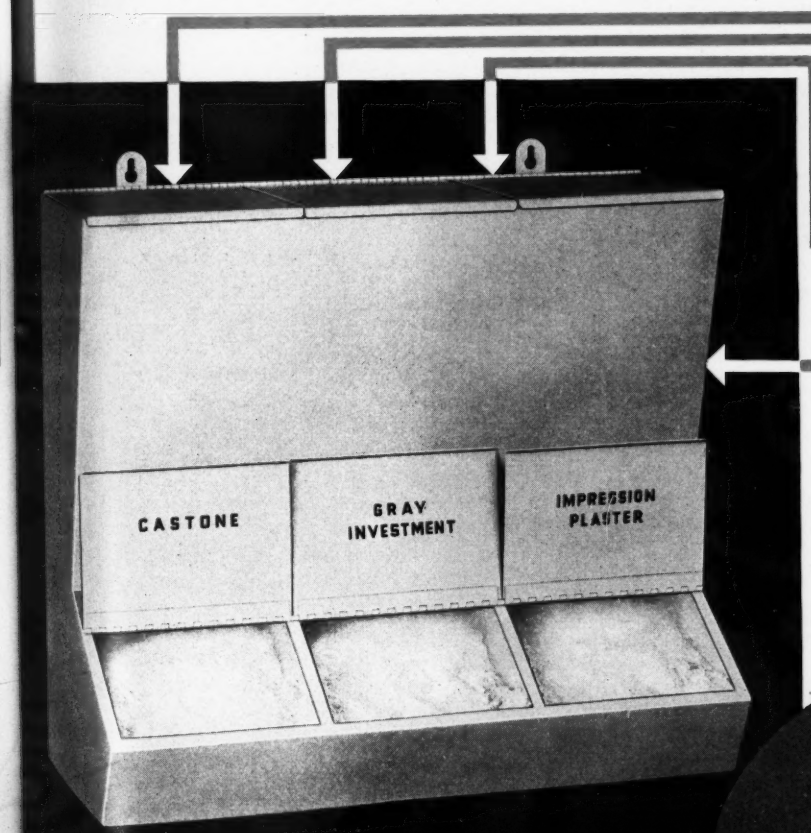

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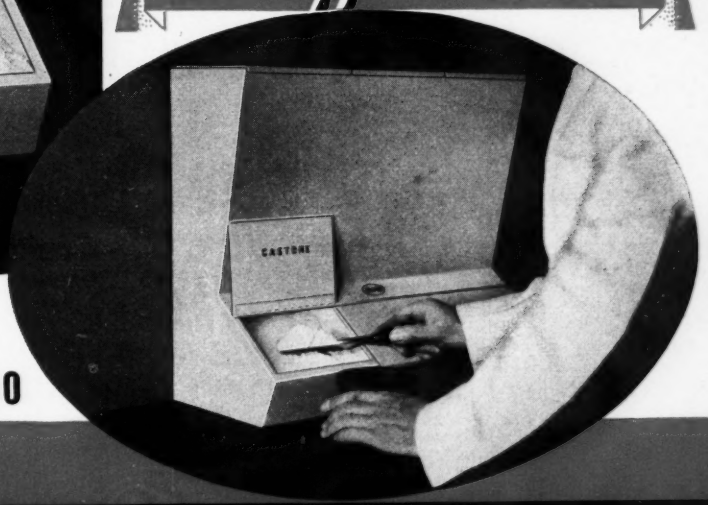

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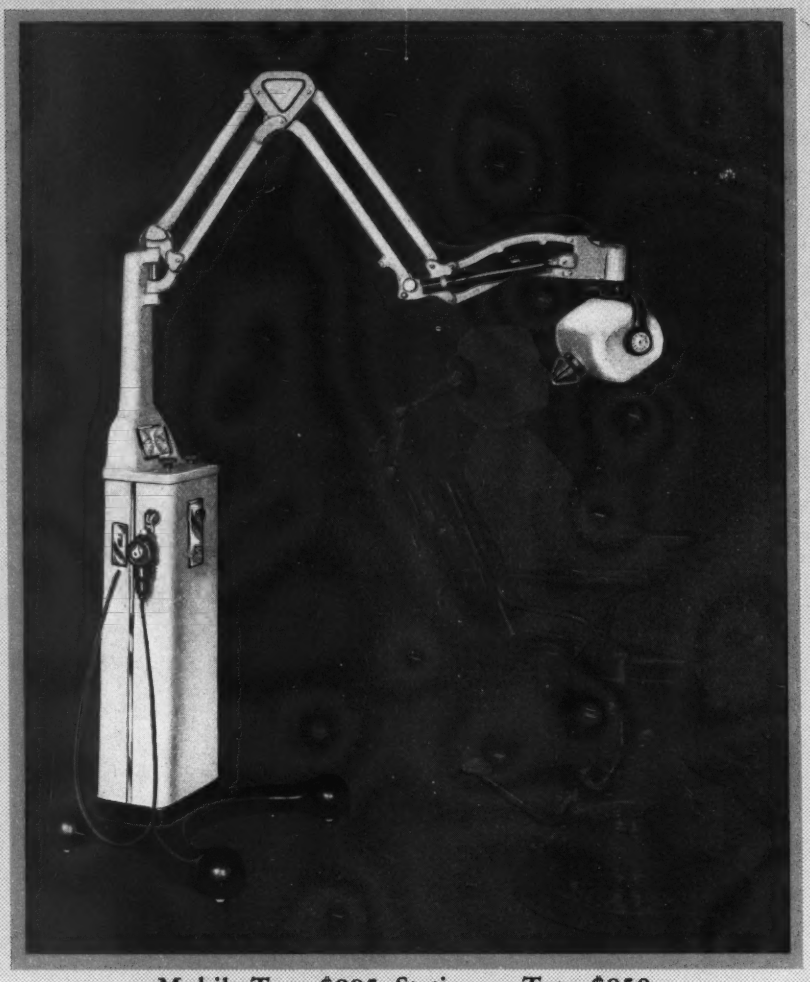

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A NEW AND EFFECTIVE MEANS FOR DENTINE DESENSITIZATION*

LEROY L. HARTMAN, D.D.S.
New York

WHEREAS dentistry made relatively rapid progress in surgery and the restorative fields, progress in the solution of the problem of sensitive dentine seemed to be more or less at a standstill.

Pain incident to the extraction of teeth is no longer dreaded; local and general anesthetics have eliminated that fear. A great many persons, however, still prefer to wait and have their teeth extracted rather than suffer the pain incident to cavity preparation.

Dental histologists and other investigators have long been contending that there are no nerves in the dentine. When patients say, however, that the only part of a dental operation they dread is having the "nerve" touched with the drill, they are probably closer to recognizing the truth than we have been as practicing dentists.

Causes of Sensitive Dentine

Burchard and Inglis[1] have advanced the following theory with regard to the cause of sensitive dentine:

The exposure of dentine to external agencies is so commonly followed by an increase in sensitivity that the condition requires description in itself. Hypersensitivity of dentine may be defined as such a degree of sensitiveness of the dentinal fibrillae as interferes with the comfortable excavation and shaping of a cavity of decay.

With the removal of caries the terminal filaments of the dentinal fibrillae become subjected to sudden variations of temperatures ranging from a little above 32° F., the temperature of ice water, to 130° F., that of very hot foods or liquids.

These thermal stimuli at times give evidence of their effect by producing painful sensations. The pulp is stimulated through the odontoblasts and their relations with the terminals of sensory nerves in the pulp, and a degree of vascular overfulness occurs which may be denominated mild hyperemia. The effect of these reactions is to cause the sensory functions of the pulp to become somewhat exalted, and it therefore becomes more responsive to the stimuli.

That the hypersensitivity is, as a rule, a disease of the fibrils involved or of the fibrils and their odontoblasts is shown by the fact that occasionally of two cavities in the same tooth one will present a hypersensitivity and another, none; again, one part of a cavity may be hypersensitive and the rest not so. In other cases perfectly normal dentine is hypersensitive, as noted when the attempt is made to reduce a sound tooth for bridgework.

There are two theories accounting for the transmission of the impulse which is translated by the patient as pain: (1) that a contraction of the whole cell, fibril and odontoblast, occurs, the sensory nerve-endings being pressed upon in the act; (2) that a wavelike motion along the protoplasm is set up, causing excitation of the sensory nerves, and that the motion is due to the incompressibility of the water (Gysi). The former is analogous to the contraction of a voluntary muscle cell under nerve impulse. The whole muscle cell contracts, though the nerve-ending is supplied to only a portion of it. This hypothesis fits the symptoms as excited by both mechanical and chemical irritants, while the latter theory does not.

2. Gysi[2] made the following report in 1905:

The dentinal tubules contain no nerves, but an organic substance which carries on metabolic changes in the dentine. The sensitiveness of dentine is, therefore, not a physiologic process, and the physiologic sensitiveness of a tooth is conceived only by means of the nerves of the pulp and of the pericementum. Sensitiveness of dentine results from pressure, tension or torsion on the organic substances of the tubules, which, in turn, convey the disturbance to the odontoblasts and then to the nerve-endings of the pulp proper.

The contents of the tubules are aqueous in their nature, and, as water cannot be compressed to any appreciable extent, the organic substance confined in the tubules represents a fixed, although comparatively easily mobile column. (Water filled in a tube one meter in length can be compressed only about 1/1000 millimeter.) As there are no nerves in the dentine, the sensitiveness cannot be overcome by an anesthetic, unless this anesthetic is conveyed through this organic substance into the pulp proper. Substances which coagulate albumin—as phenol, silver nitrate, zinc chlorid—destroy the albumin molecule with which they come in contact, but their action is cut short by their own coagulum. If, however, drugs are applied which are noncoagulants and which are absorbed by the organic contents of the tubules and are thus conveyed to the pulp, they may act as direct protoplasm poisons, depending on their individual pharmacologic action—destroying the vitality of the pulp completely, like arsenic trioxid, or paralyzing the nerve tissue like cocaine.

3. According to Doctor Herman Prinz:

The exalted transmission of sensation in cases of hypersensitivity is due to exposure of the terminal endings of the dentinal tubules to the fluids of the mouth. Following the exposure of the colloidal tubular contents, the surface tension within the tubules becomes exalted (hypertension), thereby producing an increase in the internal pressure of the colloidal solution in the tubules. As a result, the tubular contents become over-distended and exert increased pressure upon the underlying odontoblastic cells, which are in close relationship with the nerve filaments of the pulp. For these reasons, the sensations are transmitted in an exalted degree to the pulpal terminal nerve-endings, and then through them finally via the usual avenues to the receptive centers in the brain.

4. Noyes[3] has taken this position:

Few subjects in connection with dental histology have received more attention than the distribution of the nerves of the dental pulp, especially in relation to the sensitiveness of the dentine. Support for almost any idea can be found in the literature, but many of the conditions described have been shown to be errors in microscopic interpretation, and many others have failed to receive support by reinvestigation.

Noyes agrees with Carl Huber in the following description of the nerves of the dental pulp:

Usually three of four nerve trunks enter the dental pulp through the foramina. These contain from eight or ten to thirty or forty medullated nerve fibers. They pass occlusally through the central portion of the pulp, but almost immediately begin to give off branches which pass toward the periphery, branching and anastomosing in their course. Most of the fibers lose their medullary sheath very soon after leaving the nerve trunk, proceeding as beaded fibers, made up of an axis cylinder with nuclei scattered along it.

Other fibers follow an independent course through the pulp tissue and retain their medullary sheath until they reach the layer of Weil, where the sheath is lost and the fibers join the plexus of beaded fibers lying in this position. From the plexus in the layer of Weil beaded fibers are given off, passing between and around the odontoblast, forming a network around each cell, and even passing over on to the end of the cell between it and the dentine, but they have never

*Abridged and annotated by the editorial staff of the DENTAL DIGEST from the publication in the **Bulletin of the Chicago Dental Society**, January 30, 1936, of the original address, read before the Chicago Dental Society, January 27, 1936. The address was given before the joint First and Second District Dental Societies of the State of New York on January 21.

[1]Burchard and Inglis: Dental Pathology and Therapeutics.

[2]Gysi, Alfred: Deutsche Monatschrift f. Zahnheilkunde, 1905.

[3]Noyes, F. B.: Dental Histology and Embryology, Fourth Edition. Philadelphia, Lea & Febiger, 1929, page 187.

been followed into the dentinal tubules. In no instance and by no method that he employed was Doctor Huber able to demonstrate nerve fibers in the dentinal tubules.

The sensitiveness of the dentine, in view of these observations, is due to the presence of living fibrils, connected with living odontoblasts which are in physiologic connection with nerve fibers. It is interesting to note that this is the only instance in which a connective tissue cell is intermediate between the outside world and the nerve fiber. In all other instances an epithelial cell is intermediate between the environment and the nervous system. The sensitiveness of the dentine, is, therefore, due to the irritability of the cytoplasm of the fibril, transmitted through surrounding nerve fibers. The irritation to the fibril, may be either traumatic, chemical, or thermal. For instance, salt is sprinkled on exposed living dentine, and a sharp sensation of pain is the result. It may be supposed that chemical changes are set up in the cytoplasm of the fibril which excite changes in the cytoplasm of the odontoblasts. These react on the cytoplasm of the nerve fiber, and so are transmitted to the nerve center, being recognized in consciousness as a sensation of pain.

In the same way traumatic irritation caused, for instance, by the cutting of dentine with a steel instrument sets up changes in the fibril in the same fashion. It is impossible to conceive of any vital activity of cytoplasm otherwise than as a form of chemical action or molecular or automic movement of its substance.

Certain clinical facts are well explained by these structural facts. It is often noted in the preparation of cavities that the dentine is most sensitive at the dento-enamel junction. This is expected when it is recalled that at the dento-enamel junction the dentinal tubules fork and the fibrils anastomose, so that an irritation to a few fibrils is not simply transmitted to their odontoblasts and the nerve-endings in contact with them, but to all fibrils, and thus to the nerves in contact with all the odontoblasts. The presence of dilute acids renders the cytoplasm of the fibrils much more irritable. The dentine in a carious condition, is, therefore, much more sensitive than that in a sound or normal area. The sensitiveness of extremely hypersensitive dentine can often be greatly reduced, if not entirely overcome, by cleansing the cavity thoroughly, washing with tepid water followed by a dilute alkali, and drying and sealing for a few days. It will then usually be found that excavation can be carried out without excessive pain. The sealing must be perfect. If it is leaky the cavity will be more sensitive than ever at the end of the delay.

The nerves of the pulp not only respond with sensations from the irritation of the fibrils in the dentinal tubules, but because of their confinement in a calcified chamber and the semifluid nature of the tissue, they are sensitive to pressure, either increased or decreased. The normal response to changes of temperature, as well as most of the pain in pathologic conditions of the pulp, are probably caused by changes of pressure, through disturbance of the blood circulation of the tissue.

Desensitizing Methods

The various methods that have been used, some of which are still being used, to desensitize dentine in cavity preparation, in the preparation of teeth for crowns, and in the treatment of exposed sensitive areas of teeth are the following:

Methods No Longer Used—1. Arsenic trioxide which was sealed in the tooth. The dentine was desensitized but the pulp was devitalized.

2. Buckley's desensitizing paste which was also sealed in the tooth. This paste contained solution of formaldehyde, and also devitalized the pulp.

3. Solution of cocaine hydrochloride which was carried into the dentine by cataphoresis.

4. Solution of cocaine hydrochloride which was forced into the dentine with a high pressure syringe.

5. Potassocoin. This was a solution of cocaine in alcohol and ether, with the addition of a small quantity of caustic potash.

6. Vapocain, a local obtundent, contained 15 per cent cocaine hydrochloride in an ethereal solution.

Potassocoin and Vapocain were discussed in the literature. It was stated that the solvents had to be evaporated before the cocaine could act on the dentinal fibers.

7. Buckley's solution contained cocaine hydrochloride, 20 grains; chloroform, 2 drams; ether, 1 ounce. It was applied locally and dried. It was suggested that menthol could be substituted for the cocaine.

8. The use of an ether spray by first placing a pellet of cotton in the cavity to prevent the pain from the ether when striking and evaporating on the surface of the exposed dentine. After a few minutes the cotton was removed and the spray continued all the time the operator was working. Ethyl chloride was sometimes used in the same way.

Methods Still in Use—The following desensitizing methods are still in use, but with only a fair degree of success:

1. Isolation of the teeth with the rubber dam and a dry field.

2. The use of sharp hand cutting instruments with deft strokes.

3. Sharp burs, revolved slowly and removed from the tooth to allow the bur to cool; or a blast of air kept on the bur all during operation.

4. A steady flow of mouth temperature water on the tooth and stone in using stones for grinding down teeth for crowns.

5. Moistening the cavity by phenol or eugenol during the operation.

6. The use of caustics, such as zinc chloride (deliquesced), absolute alcohol, trichloracetic acid, from 10 to 15 per cent solution; or silver nitrate, from 10 to 50 per cent solution, and zinc chloride.

7. Procaine hydrochloride solution injected so as to block the nerve supply to the tooth. It is often possible to extract a tooth but not possible to cut a cavity in a tooth without pain. This is the most commonly used method today in the treatment of sensitive dentine.

8. Analgesia in the form of nitrous oxide inhalation. This method is being used extensively after having been discarded for about twenty years. The patient is only partly anesthetized by this method.

9. A combination of cocaine hydrochloride and phenol in equal parts applied on a pellet of cotton topically in the cavity.

10. The insertion of a solution of procaine hydrochloride in ether into a small cavity in a tooth, covered with unvulcanized rubber and compressed with an instrument. This pressure anesthesia is the same as that used for the removal of pulps when only aqueous solutions of cocaine or procaine hydrochloride were employed.

New Theory of Dentine Sensitivity

Background—In 1910 it was my privilege to begin my studies of dentistry under two men, G. V. Black and Frederick Noyes, who inculcated in me the desire for more knowledge in the fundamental sciences and the desire to apply this knowledge to the field of dentistry.

In my first few years in practice I followed the then accepted methods of a dry field and sharp cutting instruments to prepare cavities with the least amount of pain.

About twenty years ago I began an intensive study of sensitive dentine, especially sensitive necks of teeth. I was close to the present solution of this problem at that time because I had made a solution which by accident was similar to my present formula. If I had experimented with other solvents at the time I might have blindly stumbled over a desensitizer which would have worked. The principle on which I was working then, however, was to carry something into the dentine which would seal the outer surface by some chemical means rather than by a filling.

Through the years I have added to my knowledge in the fundamental sciences. I have made a careful study of thousands of cases of sensitive den-

tine and noted especially methods of instrumentation and filling operations which reduced considerably the pain incident to restorative procedures.

About two years ago I decided that the theories, which the dental profession had accepted about the transmission of sensation through the dentine did not conform with the knowledge of the transmission of sensation in other parts of the body.

Statement of New Theory—The new theory in regard to the sensitivity of dentine is as follows: *The dentine must contain lipoids*[4] *which play an important part in the transmission of sensation in and through the dentine.*

What Theory Explained—1. This theory explained to me why so many remedies employed in dental practice were more or less successful in the treatment of sensitive dentine.

2. This theory explained to me why the ether spray and the use of chloroform in a cavity made the surface of the cavity less sensitive. *They are both lipoid solvents.*

3. This theory also explained to me why the essential oils seem to have a sedative effect on sensitive dentine and so-called pulpitis. *They are soluble in lipoids.*

Underlying Principle of New Anesthetic Solution

Attacking Lipoids—On the basis of my new theory I planned a method for attacking the lipoids in the dentine. *If lipoids were present in the dentine, why should it not be possible to work out a topical application which would confine all the action to the immediate vicinity of the application?*

Reversible Action—I decided that I would try to develop an anesthetic solution with a reversible action—a solution that would localize the action in a definite zone. *The one part of the solution to consist of something which would dissolve lipoids; the other part of the solution to consist of something which would be soluble in lipoids.*

In other words the lipoids would be subject to two opposing actions, and, therefore, if the proper balance could be maintained the anesthesia would last for a considerable period of time.

Selection of Lipoid Solvent—The lipoid solvent for the solution was quickly chosen. I selected ether alone or ether and alcohol together, because they are used in the pathology laboratory to extract the phospholipins from nerve tissue.

Requirements of Soluble Constituent—For the second part of the solution I sought something that would be *soluble in lipoids* and also if possible act as a *eutectic.*

I spent a considerable time studying the various available possibilities. I thought that in the phenol group I should probably find a suitable constituent.

I wanted a constituent that would be (1) crystalline in form; (2) soluble in ether and alcohol, and (3) fairly insoluble in saliva.

Selection of Soluble Constituent—From my experience with thymol in some of my earlier experiments, I knew that it was soluble in 1.5 parts of ether or in 1 part of alcohol; that it would crystallize out of a solution and remain on the surface of the dentine, and that the crystals were soluble in 1000 parts of water. I therefore selected *thymol*[5] for my second constituent, because it seemed to meet all the requirements and would be fairly *insoluble in saliva.*

Proportions—In trying to work out some possible proportions, I decided that if the action was to be reversible the proportions should be fairly close to a saturated solution. There should be a surplus of ether to take care of the initial solution of the lipoids and allow for possible evaporation while carrying the application on a pellet of cotton from the bottle to the tooth cavity.

First Solution—Inasmuch as 1 part of thymol is soluble in 1.5 parts of ether, I made my first solution with 1 part of thymol and 2 parts of ether, leaving just one-half part of ether as a surplus.

Early Experimental Technique

1. The moistened pellet of cotton was placed in contact with the sensitive dentine, a simple contact without pressure.

2. The pellet was allowed to remain for one minute.

3. The pellet was removed and with a blast of warm air an attempt was made to leave a film of thymol over the exposed portion of the dentine.

Experiments on Human Subjects

The patients on whom this experimental work was done could be relied on to give me an accurate description of their pain reactions.

First Application—It did not seem possible that I should be able to scrape vigorously with a spoon excavator in a previously sensitive cavity, cut into the dentine with a bur and have the patient say that it felt as though I were cutting chalk or wood. The effect was even more than I had expected, and in a short time sensation returned. In the return of sensation the patient was not conscious of any definite change until the cavity was touched with an explorer. Many more cavities were prepared with this particular formula.

Modification of Formula—I then modified my original formula by adding 1 part alcohol, because it would act as a synergist with the ether. This necessitated increasing the amount of thymol from 1 part to 1¼ parts, thus giving a greater working range for the solution. I noted that the anesthesia became more profound and lasted a longer period. In many of the cases checked, the depth of anesthesia seemed to be reached about two minutes after the application was completed and lasted for more than one hour's time. No case of so-called pulpitis was ever observed in any of the cases treated.

Controls—One of my patients had a whole series of gingival third cavities in both the upper and lower jaws. I prepared a cavity on one side of his mouth without the desensitizer and prepared one in the identical tooth on the opposite side of his mouth using this solution. This procedure was repeated in several instances with the patient remarking as follows: "When you are cutting the tooth without the desensitizer it seems as though you are cutting marble. When you are cutting the tooth in which the desensitizer has been used, it seems as though you are cutting chalk."

Experiments with Varying Combinations—In order to check the efficiency of other combinations of ether, alcohol, and thymol, I made a series of solutions varying the amounts of each of the constituents. I made some solutions with additional constituents and in some cases made substitutions for the thymol.

I would swab the exposed dentine with one of the solutions and then would proceed with the preparation.

[4]EDITOR'S NOTE: A lipoid is defined in Dorland's Medical Dictionary as follows: "Any one of a class of cell components, other than liquid fats, which can be extracted with organic solvents like alcohol and ether."

Also: Mathews, A. P.: Physiological Chemistry, Second Edition, New York, William Wood & Co., 1916, page 61: "It will be recalled that all living matter contains a larger or smaller amount of organic substances which are soluble in alcohol, ether and other fat solvents. These substances help to give to protoplasm its properties of containing large amounts of water but not dissolving; and also the power of taking up readily and in large amounts chloroform, ether and other substances soluble in fats but not readily soluble in water. They are among the ever-present constituents of living matter."

Again: MacCallum, W. G.: Pathology, Fifth Edition, Philadelphia, W. B. Saunders Company, 1932, page 78: "The fat-like bodies soluble in organic solvents, such as ether, alcohol, chloroform, or benzol, are defined by Bang as lipoids. It is perhaps common, however, to speak of the neutral fats as fats, and of the rest as lipoids, since that must have been the origin of the word."

[5]See Editor's Note, page 45.

FORMULA BY WEIGHT

**Thymol .....1¼ parts
Ethyl alcohol 1 part (95%)
Sulphuric ether
(anesthesia) 2 parts

1. Keep tightly corked in a brown glass bottle.
2. One-half ounce is sufficient for 200 applications.
3. A fresh solution should be prepared more frequently when the weather is dry.
4. A stopper with a tin lining is preferable.
   Cork stoppers changed frequently are satisfactory.
   Rubber stoppers should not be used because they will be dissolved.
   Glass stoppers become clogged with the thymol and will allow the ether to evaporate.

**EDITOR'S NOTE: The following additional information is given for the convenience of readers:

1. "Oil of Thyme is a volatile oil distilled from the flowering plant of **Thymus vulgaris** Linné (Fam. **Labiotae**). Oil of Thyme yields not less than 20 per cent, by volume, of phenols.

"Description and physical properties. Oil of Thyme is a colorless, yellow, or red liquid with a characteristic, pleasant odor, and a pungent, persistent taste. It is soluble in 3 volumes of 80 per cent alcohol. The specific gravity of the Oil at 25° C. is between 0.894 and 0.930. It is slightly laevorotatory, but the angle of optical rotation of the Oil in a 100 mm. tube at 25° C. is not more than —4°.

"Test for Purity. Shake 1 cc. of Oil of Thyme with 10 cc. of hot distilled water and, after cooling, pass the aqueous layer through a wetted filter: the filtrate does not assume a blue or violet color upon the addition of a drop of ferric chloride T.S."—**From The National Formulary, Sixth Edition, 1936, page 275.**

2. "Thymol . . . is of nearly neutral reaction. It is practically nontoxic. It melts at about 122° F. (50° C.), is slightly soluble in water (1:1,100), but very readily soluble in alcohol, ether, essential and fatty oils, chloroform, glacial acetic acid, etc. When treated with camphor, menthol, chloral, etc., it liquefies. In its local action it closely resembles phenol and salicylic acid. It is not as caustic as phenol, but more destructive to putrefactive substances.

"Therapeutics.—Thymol . . . was introduced into general medicine in 1876. Thymol has been highly recommended by dental practitioners, and its valuable antiseptic properties have been sustained. In combination with other similar remedies, it is to be recommended on account of its persistent action. A saturated alcoholic solution of thymol is recommended by Hirsch as a specific for the treatment of chronic alveolar abscesses. Its irritating nature prohibits its use in acute pericementitis."—**From Prinz, Herman: Dental Materia Medica and Therapeutics, St. Louis, C. V. Mosby Company, 1917, page 198.**

3. "In its local action thymol closely resembles phenol and salicylic acid. Although it is not as caustic as phenol, it is very irritating to raw surfaces. While thymol readily checks putrefactive processes, its penetrating powers are not great, as it is not soluble in the tissues. All investigators do not agree as to the antiseptic value of thymol. It is too irritating to be employed in root canal therapy. . . . Today, thymol is used chiefly as a constituent of antiseptic and astringent mouth preparations. Internally, its chief use is as an anthelmintic for the hookworm. This treatment is not without danger of poisoning."—**From Blayney, J. R.: Dental Pharmacology and Therapeutics, St. Louis, C. V. Mosby Company, 1934, page 119.**

Many of the solutions caused pain merely on their application and would not permit me to cut any of the sensitive dentine. After other solutions were used the patient could always notice a marked difference when I returned to the original formula.

I found that a solution between 75 and 90 per cent saturation of thymol in ether and alcohol was the most effective.

Follow-Up—I was anxious to find out whether after the desensitizer had been used and sensation returned there would be any perceptible difference in sensation if observed over a period of time.

I selected a patient for whom I prepared several large cavities for gold inlays. They were prepared under the desensitizer and filled temporarily with gutta-percha. The patient returned every week for four weeks, so that I could remove the gutta-percha temporary filling and examine the interior of the cavity with an explorer. The reaction seemed to be normal on each occasion. The inlays were then completed.

PULP REACTION

In order to prove that the pulp was not affected by the application of the desensitizer, four cases were then selected for experimentation. The patients were going to have dentures made and in each instance had a few sound anterior teeth remaining. They granted their permission to have these experiments performed on the teeth that were going to be extracted. In each case the sound labial enamel plate was cut through to the dento-enamel junction with a wheel stone. The solution was applied and allowed to remain for one minute; a second cut was then made with the same stone deeper into the dentine, and a second application made. In each case it was decided to extract the prepared tooth and another one as a control. The period of time between the applications and the extractions varied from a few hours to a period of a week.

The teeth were immediately prepared, the pulps fixed and serially sectioned and examined by Doctor Lester Cahn of our division of oral pathology. I was elated to have him report that every pulp was absolutely normal.

COMMENTS AND CONCLUSIONS

1. When the teeth were isolated by the rubber dam and kept dry during the operation the sensation did not return in many cases until more than one hour's time. When saliva was allowed to come in contact with the teeth soon after the application,

(*Continued on page* 56)

DIRECTIONS FOR USE

1. A rubber dam in position is preferred.
2. If cotton rolls are used, varnish the gums surrounding the tooth and change cotton rolls immediately after the application. Any varnish or vaseline may be used. Wipe the saliva away from the field of operation with a cotton pellet.
3. A topical application is made on a moistened pellet of cotton, not saturated, directly to the dentine or caries. This will not act through enamel. If applied over the caries, a second application may be necessary after the caries has been removed.
4. Keep the pellet in contact for 1 minute in children's teeth; 1½ minutes in adults' teeth. Remove the pellet and direct a blast of warm air to the area of application. *Do not attempt to dehydrate.*
5. The depth of anesthesia is obtained about 2 minutes after the application. If the rubber dam is used the anesthesia will usually last more than one hour's time. If cotton rolls are used and the saliva is allowed to come in contact with the cavity after the application, the duration of anesthesia will be reduced to about 20 minutes.
6. In making the application for crown preparations, it is necessary to vary the technique of cutting through the enamel so as to expose the dentine. The dentine may be swabbed for about ½ minute when it will be possible to continue with the cutting. Several applications may be necessary before completing the preparation.
7. For fitting a band and taking an impression of a crown preparation, if the preparation is swabbed once or twice, some of the solution being allowed to flow into the gingival crevice, the patient will not complain of any discomfort while having the impression taken.
8. It should be remembered that a chemical reaction takes place when this solution is placed in contact with the dentine.

FUNDAMENTAL DENTAL MODELS

F. ACKERMANN, M.D., Med. Dent.

Geneva, Switzerland

NATURE never combined in the same mouth all the average aspects that are necessary for a complete demonstration of perfect dental morphology, occlusion, balanced articulation, and function. This is the reason that special dental models combining the perfected particulars of natural teeth are necessary. Such a set must have teeth with average contours; general proportions; upper first molars with four cusps; upper second molars with three cusps; lower first molars with five cusps; and lower second molars with four cusps. This enables one to understand molars of all types.

These three basic conditions can be found in many natural dental arcades (1) normal contour of dental arcades and teeth; (2) general proportion in the size of the teeth, and (3) classical morphology of molars. I chose a patient with dental arcades that best conformed to these conditions. I transferred these on an adaptable articulator, from which I developed the models in order to demonstrate the average morphologic and mechanical details. Three pairs of *fundamental dental models* were constructed: (1) with geometric aspect; (2) with functional aspect, and (3) with anatomic aspect.

The characteristics obtained on the adaptable articulator were (a) an average sagittal inclination of the cusps corresponding to an average inclination of the condyle path; (b) an average-incisive palatine inclination; (c) an average angle (gothic arch) for transversal movements; (d) a normal interlocking; (e) a normal balanced articulation in the movements of propulsion; and (f) a normal balanced articulation in the lateral movements.

Model Phase 1: *Geometric Schematization*—Model Phase 1 is a pair of normal dental arcades showing only the principal sliding facets of the cusps with the main grooves and the main ridges. This first schematized pair is intended for the geometric and kinematic demonstration of the morphology of teeth.

Model Phase 2: *Functional Schematization*—The second pair of normal arcades shows the principal sliding facets of the cusps; the main grooves and ridges with the location of the main depressions which allow alternately the retention and the escape of the food during mastication and which border the main crests of the triturating surfaces. The second schematized pair is intended for the demonstration of functional occlusal characteristics.

Model Phase 3: *Normal Anatomic Aspect*—The third pair of arcades shows the details of the second pair but with all the edges and ridges rounded in order to give to the teeth

(*Continued on page* 58)

See Figs. 1 to 11, inclusive, on opposite page

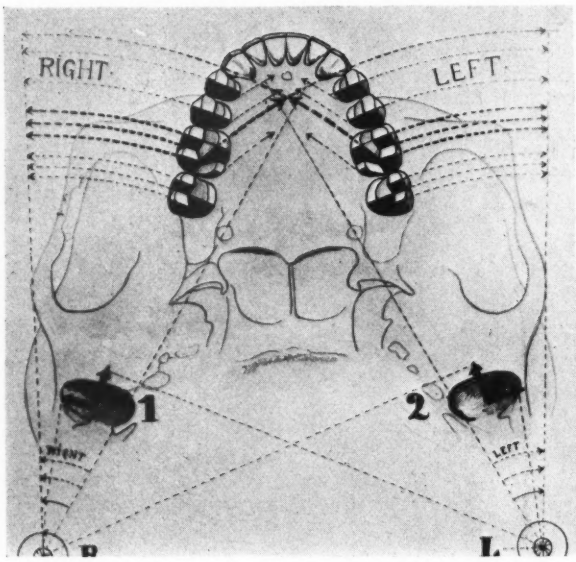


Fig. 12—Relations between tooth function and morphology. R = Instantaneous center of rotation, right; L = instantaneous center of rotation, left; 1 = glenoid fossa, right; 2 = glenoid fossa, left. The dotted lines indicate the direction followed by the lower teeth and the condyles during lateral movements. In this illustration the second upper molar has only three cusps. Compare with Fig 1.

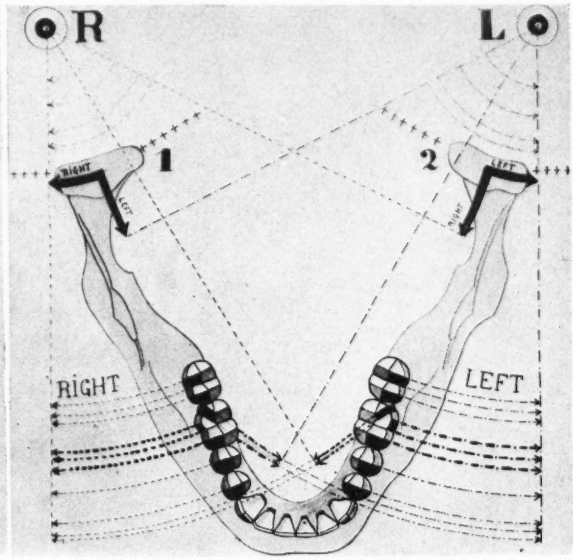


Fig. 13—Schematized illustration to show the relation between the morphology and function of the teeth. R = Instantaneous rotation center, right; L = instantaneous rotation center, left; 1 = condyle right; 2 = condyle left. Note the relation between the form of the condyle and the movements of the jaw. Note that the first lower molar is the key of occlusion and articulation. Compare with Fig. 1.

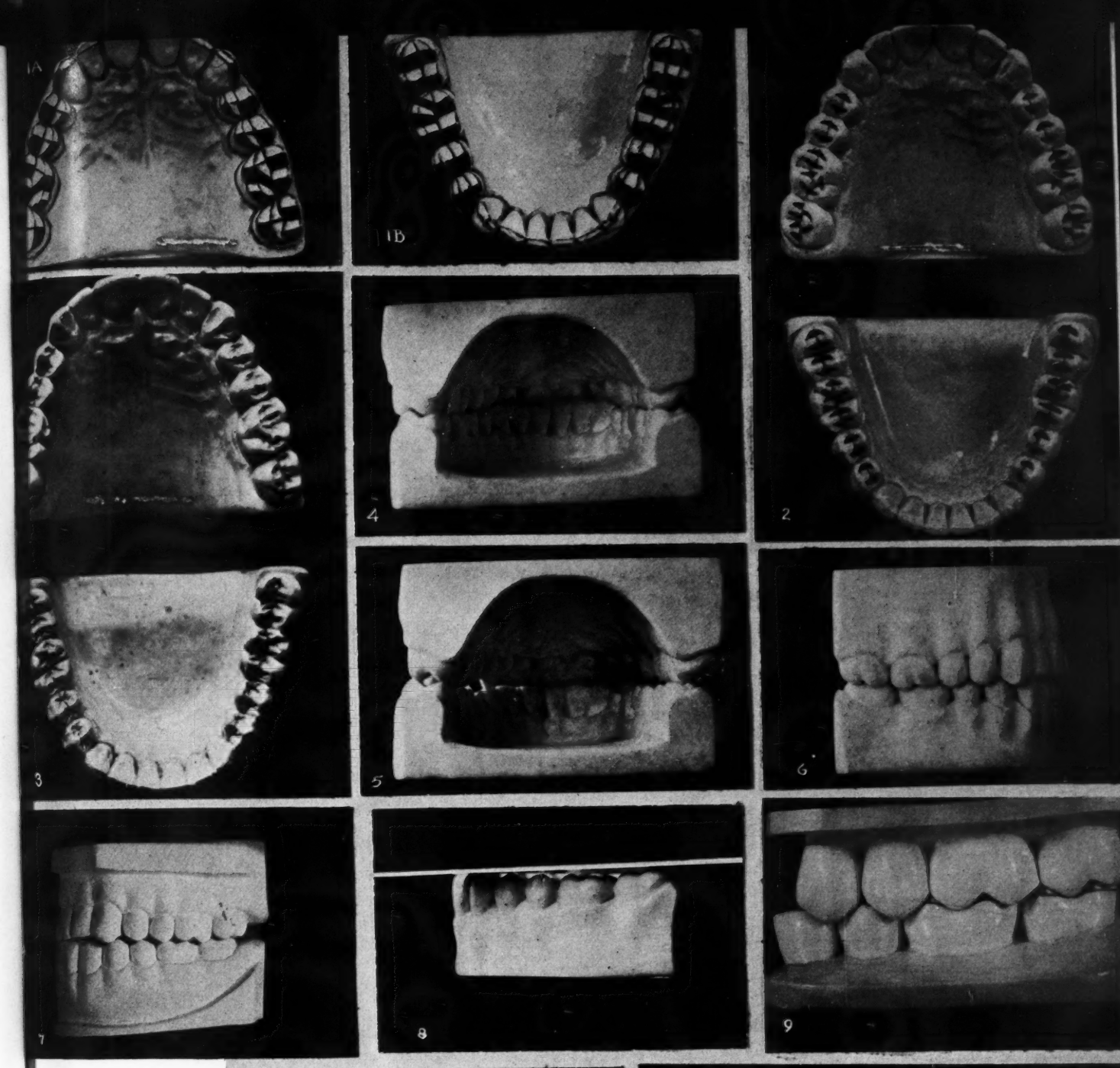


Fig. 1—Phase 1: Geometric schematization. Model showing the geometric aspect of natural dental morphology. Observe the main sliding facets, fundamental grooves, ridges, and cusps. This is a basic schematized model for tooth morphology.

Fig. 2—Phase 2: Functional schematization showing the main depressions of the facets of the cusps. The second phase was attained by carving on the facets of the geometric model the main depressions of the triturating surfaces; the topography is clearly demonstrated in these figures. The main depressions border the main crests of the triturating surfaces. These models are a functional demonstration of the triturating surfaces.

Fig. 3—Phase 3: Anatomic characteristics of normal teeth, obtained by rounding the main ridges and depressions of the model of Phase 2. On the second upper molars was added a distal groove on the palatine cusp.

Fig. 4—Model as seen from the back (lingual aspect). Note the centric occlusion and perfect interlocking.

Fig. 5—Model showing perfect balanced lateral articulation. On the left side: **working side**, double contact of the cusps. On the right side: **balancing side**; single contact of the cusps.

Fig. 6—Sagittal aspect of the model. Centric occlusion.

Fig. 7—Perfect balanced propulsion of the model. Observe the contact of the teeth.

Fig. 8—Model showing an ideal curve of Spee.

Fig. 9—Blocks in centric occlusion.

Fig. 10—Blocks in a position of propulsion. Observe the contacts of the teeth.

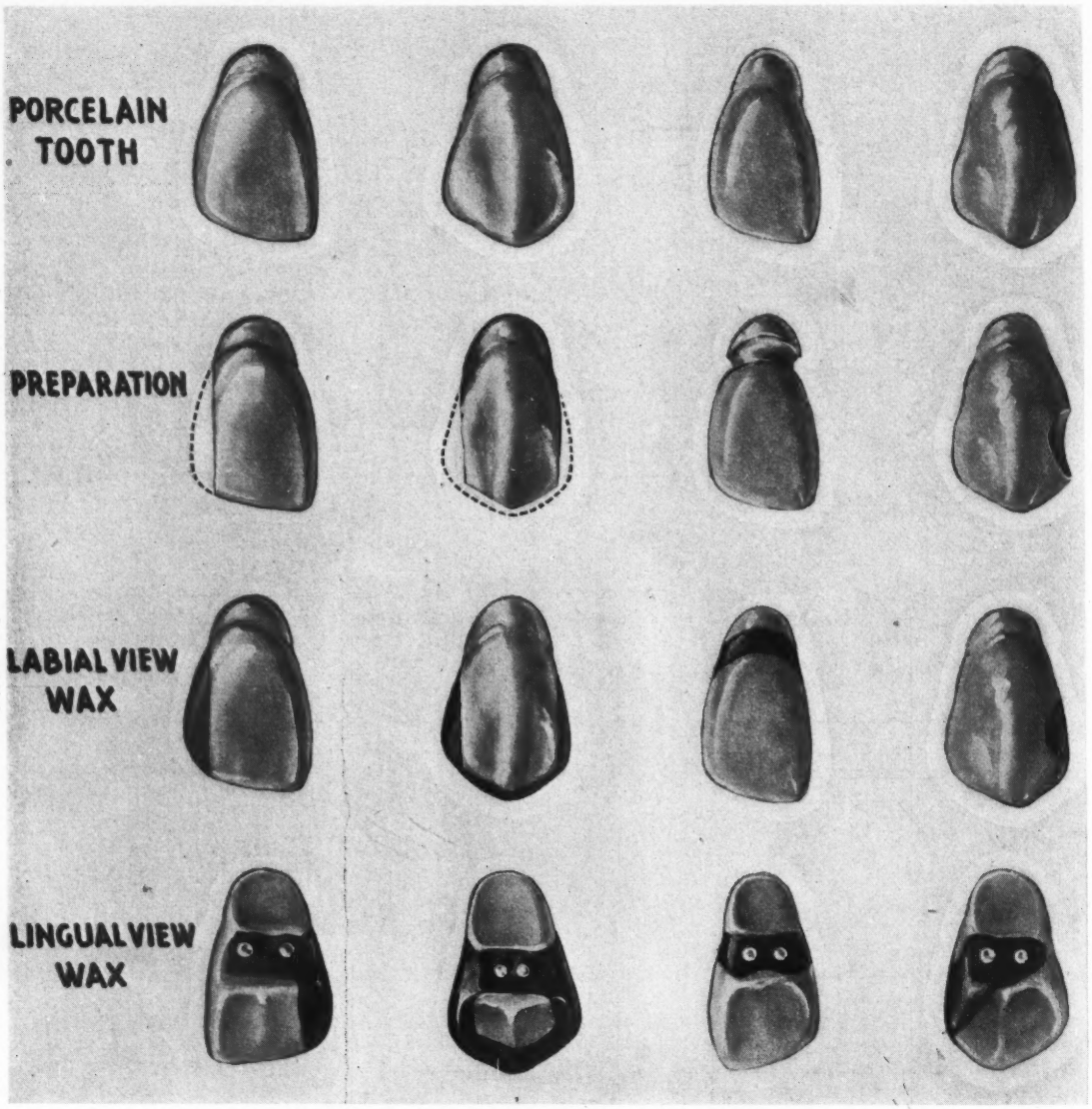
Fig. 11—Blocks showing the curve of Spee.

CASTING DIRECT TO PORCELAIN TEETH AND FACINGS

JOHN H. SMILEY, D.D.S.
Mangum, Oklahoma

CASTING direct to porcelain teeth has for its object the duplication of gold castings and restorations as found in the natural teeth. While this serves no useful purpose, it has esthetic values. Patients have always dreaded to lose their teeth because they are afraid the new ones will not look natural. A patient with a class 2 inlay in an anterior natural tooth might also want it to appear in the artificial denture.

About five years ago I had my first experience in casting direct to porcelain teeth. I was looking for an easier method of placing gold in artificial teeth. Malleting gold foil fillings in porcelain teeth is a tedious task in which teeth are often fractured. The application of gold foil to porcelain teeth is virtually limited to class 3 cavities. Often a gold foil filling which I believed to be inserted permanently would be lost a few years later. This led me to casting direct to porcelain teeth in duplicating class 3 cavities, and later, to more extensive cavities. The results were successful, and I do not hesitate to make the statement that it is a simple procedure to cast a class 2, 3, 4, or 5 restoration to any anterior porcelain tooth.



Several aspects of tooth preparation required for casting direct to porcelain.

Advantages

1. By casting direct to teeth and facings, it is possible to place the gold exactly where it is desired, with less effort, with better appearance, and with greater durability.

2. In using pin facings for bridge pontics I would rather cast direct than adapt the gold backing. This gives a moisture-proof union of the gold to the porcelain. Neater and better incisal protection can be employed. This is the most economical of any good pontic. I frequently use anterior vulcanite teeth instead of facings for bridge pontics by casting direct to them.

3. When inlays and castings are cast to fit an artificial tooth the cavity preparation is more difficult, and it is necessary to cement the casting to place. After vulcanization the cement is weakened if not undermined.

4. It requires little more time to cast direct to porcelain than to make any other type of casting.

Preparation of Vulcanite Teeth for Castings

1. For a three-quarter crown or class 4 casting, make a slice preparation, omitting the grooves.

2. For any incisal casting, remove the amount of porcelain to be replaced with gold. Grind off a thin layer of the lingual portion of the tooth, so that gold will cover the entire lingual surface.

3. For gingival cavities, remove a small amount of porcelain only on the labial surface. The cavity should be cut shallow and the base of the cavity should be concave.

4. For mesial or distal castings, make a slice preparation. The amount of porcelain removed depends on the amount of gold one plans to display.

5. For open-faced crowns, it is not necessary to remove any porcelain. Permit the gold to engage the lingual surface slightly for retention. To prevent breakage, be careful not to envelop too much of the tooth.

6. In all preparations avoid frail margins, sharp angles, and undercuts. Do not let the wax extend beyond the uncut surface. Trim off all excess wax. It is not necessary to let the wax engage too much of the pins; if the pins are slightly engaged the necessary retention is had. Enough of the pins must remain uncovered to enable the denture material to secure ample lock. A softer wax works better for this type of work. A sharp lance is ideal for trimming and shaping the wax.

7. In preparing the pin facings and anterior vulcanite teeth for direct casting, bevel the incisal as for backing with gold.

8. The same technique is used to cast an inlay except that the mold is permitted to cool more slowly.

9. In soldering, facings should always be slightly spaced to prevent checking. By using pin facings and anterior vulcanite teeth, it is possible to employ "blind tipping," so that the incisal edge and bite section are properly reinforced.

Sprueing—Sprueing is done in the usual manner, as it is for ordinary casting.

Investing—Various investments have been employed and all seem to work well. I prefer a softer investment or one that has a low plaster content.

Burning Out—Burning out is done as for casting. The mold should be a *fairly bright red;* this is important. The investment should show red at the sprue hole.

Casting—Preheat gold and cast immediately. Slight pressure in casting is sufficient. I have used a tremendous pressure in casting without breakage.

Cooling the Mold—To hasten cooling, place the mold in a copper flask, because copper is one of the best conductors of heat. Sprinkle the mold with warm water. It is not necessary to exercise any special care in cooling the mold; it can be safely cooled in about five minutes.

Choice of Gold

The choice of gold depends on the color desired and the portion of the tooth that the gold will occupy. When the gold is placed on the incisal edge, it is more practical to use a hard gold; this applies to any casting that is in occlusion. For gingival and interproximal cavities any scrap or soft gold can be used.

Conclusion

I have heard dentists express unnecessary fears regarding the use of this technique. They relate that in their early practices, they attempted direct casting to porcelain with unsuccessful results. Their contention is that the porcelain in later years becomes crazed or crystallized; that when they cast direct to facings the platinum pins become crystallized and the facings fall off the teeth. I have been doing this type of work extensively for five years and have not met with any failures. We have all been constantly advised that porcelain is an extremely delicate substance; my experience with it has convinced me that porcelain tolerates a great deal.

The porcelain made today is infinitely better than the porcelain that was made twenty-five or thirty years ago. The only manner in which I have been able to get breakage was by (1) not having the mold hot enough; (2) having undercuts in the porcelain; and (3) leaving frail edges and sharp angles in the preparation.

If the technique described could be expressed in one word, that word would be "heat." To get the best results a high heat technique should be used and undercuts and frail edges avoided.

RECENT PUBLICATIONS ON SICKNESS AND HEALTH INSURANCE

1. The Radio Debate on State Medicine, A. M. A. Bull. **30**:113 (November) 1935.

2. Complete Handbook on State Medicine, Debaters Information Bureau, 45A Free Street, Portland, Maine.

3. A Digest of Sickness Insurance, Chester County Medical Society, West Chester, Pa. Address R. T. Devereux, M.D., 37 South High Street, West Chester, Pennsylvania. (30 cents postpaid)

4. Discussion Outline of Social Medicine and Sickness Insurance, State Medical Society of Wisconsin, Madison, Wisconsin. Address J. G. Crownhart, Secretary, State Medical Society of Wisconsin.

5. Handbook, Minnesota State Medical Association, 11 West Summit Avenue, St. Paul, Minnesota.

6. Handbook of Sickness Insurance and State Medicine and the Cost of Medical Care, A Digest from Various Sources, Bureau of Medical Economics, American Medical Association, 535 North Dearborn Street, Chicago.

COMPRESSED CEMENT PROTECTION IN DEEP CAVITIES

I. A. SMOTHERS, B.S., D.D.S.
Evanston, Illinois

WHEN preparing a cavity to receive a gold inlay, it is often necessary to provide a cement base. This may be required either to eliminate an undercut or because the depth of the cavity demands cement protection from the inlay. In some cases in which there is only slight remaining caries after the cavity is otherwise completed the wax pattern may be made at this stage and the decay removed afterward. The cement base is then automatically provided when the inlay is set. In many deep cavities, however, the cement base must be made before the pattern is made.

Indications for Use

1. Particular indications occur when the operator knows that an exposure is possible. In this case it is imperative to complete the preparation and, if there is no exposure, to provide the proper protection at once.

2. There are many cases of deep cavities in which the operator desires to provide particular treatment to the floor of the cavity. Such treatment will be described under the heading "Technique." Following this procedure a cement base should still be placed.

3. Following a root canal filling when the cavity is otherwise prepared (Figs. 5 to 8), the technique to be described will be found advantageous.

4. The more difficult the cavity is of access the greater will be the help that the compound plunger will provide. The procedure will be as simple and the results as certain as in an easy cavity.

5. The technique is a help when, after a jacket crown preparation, there remain depressions which should be filled so as to produce the typical cone desired. The cement will be dense and it will stay put.

6. The technique may be used to eliminate the surface inequalities after three-quarter crown or full crown preparations.

Placing of Cement Base

Difficulty often attends the placing of a dense and tight cement base. When introduced by the usual method, it may easily be dislodged by subsequent trimming or even when taking the impression for the inlay. By the usual methods it is at best likely to be insecure; confidence cannot be placed in its stability. Before the inlay is set, therefore, it is often better to lift the cement out and let the inlay force the material to place when setting. It is better to be done once and for all with the cement base. There is less added subsequent irritation to the dentine, and consequently far greater comfort to the patient. This is especially true if procaine hydrochloride has been used during cavity preparation. A good cement base placed at the time will yield a more comfortable cavity to deal with when it is time to set the inlay.

The technique to be presented provides a tight and thoroughly condensed cement protection in all deep cavities. Even in its thinner layers, this cement will not chip during any subsequent trimming. Little trimming, however, will be necessary, because placing of the base in the manner to be described will produce a cavity form virtually ready for taking the inlay impression.

Technique

1. Without regard to the remaining carious dentine, the cavity is prepared properly with regard to the removal of weakened enamel walls and completion of all cavosurface angles (Fig. 1). The operator should be certain that the gingival cavosurface angle is properly completed with gingival margin trimmers, so that there is no possibility that it will have to be altered after the final decay is removed.

2. A good-sized cone of modeling compound is softened with the base harder than the tip and forced into

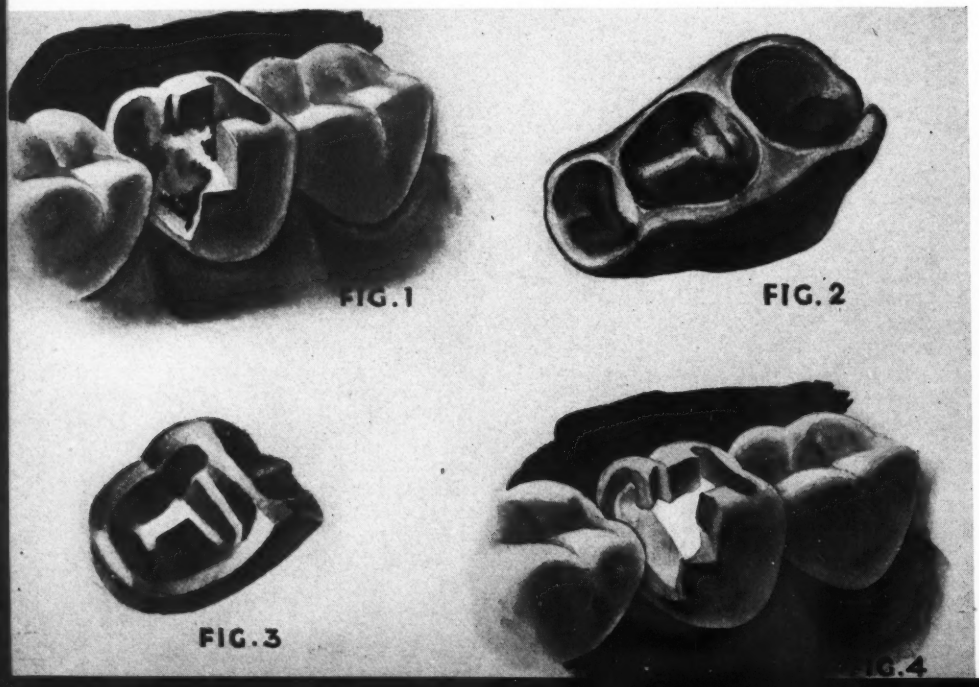


Fig. 1—Preparation with some decay remaining. Note sound, white, peripheral margins.

Fig. 2—Untrimmed compound impression.

Fig. 3—Trimmed compound impression. Note similarity in outline to Fig. 2.

Fig. 4—Molar after cement is placed. Note similarity in outline to Fig. 1.

the cavity. The tooth on each side of the tooth having the cavity should be included.

3. When hard, remove and examine. The gingival wall must be definitely outlined (Fig. 2).

4. With sharp instruments the internal portions of the cavity part of this impression are shaped until its walls and angles are as sharp and definite as any ideal textbook inlay appears. Sufficient compound is also trimmed away from the other portions of this impression, so that it will go to place easily into the cavity and over the occlusal surfaces of the teeth on each side of the tooth being treated (Fig. 3).

5. With cocoa butter every detail of the inside of this trimmed impression is lubricated, and the impression is laid aside.

6. Remove the remaining decay and perform such other safeguards as may be indicated. (If desired the rubber dam may be used at this time; but in this case, if a clamp is in position be certain that the compound has been trimmed, so that the clamp will not prevent its proper seating.) At this stage it is possible to sterilize the cavity with such agents as phenol, or cresatin, and follow this with the use of a liquid cavity lining and a bland, slow-setting paste, such as zinc oxide powder and eugenol, or one of the proprietary preparations composed in the main of these materials.

7. A mix of cement is now made, slightly thicker than would be used for inlay cementation. Introduce a liberal amount into the cavity, making certain that no air is trapped at any point. Should the interproximal space become filled with cement, pay no attention to this, as this surplus will be taken care of automatically.

636 Church Street.

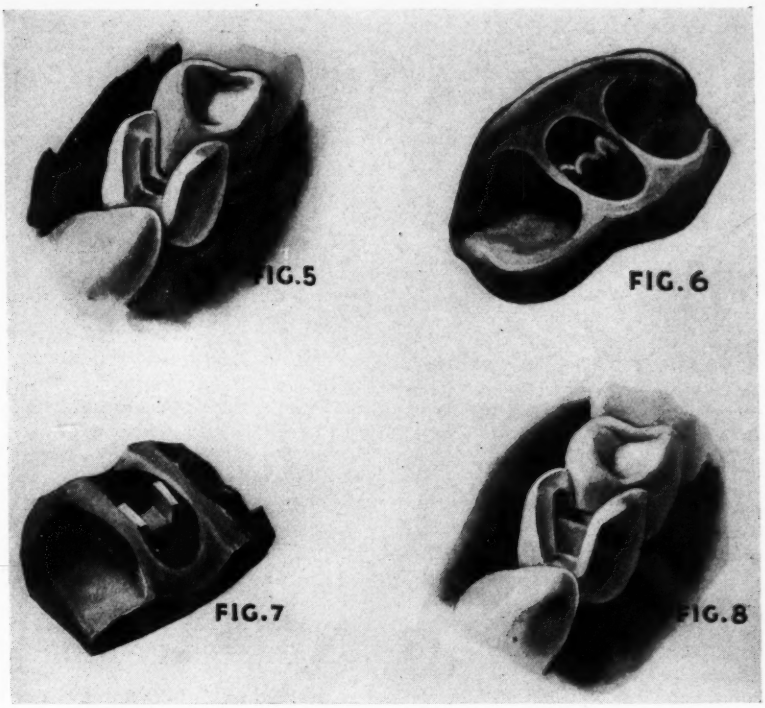


Fig. 5—Bicuspid after root filling. Note gutta-percha.

Fig. 6—Untrimmed compound impression.

Fig. 7—Trimmed compound impression. Note similarity in outline between Figs. 6 and 7.

Fig. 8—Bicuspid after cement is placed. Note similarity in outline between Figs. 5 and 8.

If there are no undercuts in the occlusal step and no protection is desired there, do not fill that portion of the cavity.

8. The lubricated compound plunger is now pressed to place with a firm steady pressure and held until the cement is set. When the cement is hard a little wiggling manipulation will easily lift the compound out and there will be revealed an ideal cavity preparation with a hard, glossy cement base that will not be dislodged. There may be a tissue-thin layer of cement over the entire tooth, but as soon as saliva is again allowed to touch the tooth, this cement is quickly flaked off the tooth.

9. With sharp chisels and gingival margin trimmers all the cavosurface angles may in a few seconds be entirely cleared of surplus cement, and there is no danger of dislodging any part of the cement base (Fig. 4).

ABOUT OUR CONTRIBUTORS

LEROY L. HARTMAN, D.D.S. was graduated from Northwestern University Dental School in 1913. Doctor Hartman's previous publications in the dental literature have been on the subject of gold foil restorations in the old DENTAL DIGEST and the *J. A. D. A.*, and on the subject of micro-organisms of the mouth in the *Northwest Journal of Dentistry*. Doctor Hartman is a member of the American Dental Association and component societies, and is professor of operative dentistry at Columbia University School of Dental and Oral Surgery. Doctor Hartman's desensitizing solution is the subject of this month's editorial.

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WESTON A. PRICE, D.D.S. (University of Michigan, 1893; M.S., 1913) began his studies included under the title WHY DENTAL CARIES WITH MODERN CIVILIZATIONS? in the March, 1933, number of THE DENTAL DIGEST, and carried them through August, 1933; the second series, from February to July excluding May, 1934; the third series in May and June, 1935. Doctor Price's complete professional biography appeared in March, 1933; in April, 1933, he was the subject of a special feature article in which he was described at work in his research laboratories.

WHY DENTAL CARIES WITH MODERN CIVILIZATIONS?

14. Field Studies in Kenya, Uganda, Belgian Congo, Sudan, and Egypt

(First of Two Installments)

WESTON A. PRICE, D.D.S., M.S.
Cleveland

IN THIS extended series of studies of primitive racial stocks those previously reported[1] have been largely concerned with people living in different physical conditions from those in the central area of North America. Sea foods are within reach of the inhabitants of islands and coast lines, regardless of latitude. The inhabitants of the interior of a continent do not, however, have access to liberal supplies of various forms of animal life of the sea. It has become important, therefore, in the interest of the inhabitants of the United States and Canada and other large continental interiors, to study primitive people who are living under similar environments to theirs. Africa is one of the few countries that can provide both the primitive people and the plains and plateau country in the interior of a continent. The plateau of eastern and central Africa has nurtured a score of tribes with superb physiques and much accumulated wisdom. We are concerned to know how they have accomplished this and whether they or any other people can survive in that environment after adopting the formulas of our modern civilizations? Inasmuch as the most universal scourge of modern civilization is dental caries, although caries is only one of civilization's many degenerative processes, it is important to study these people to note how they have solved the major problems of living in so severe and exacting an environment.

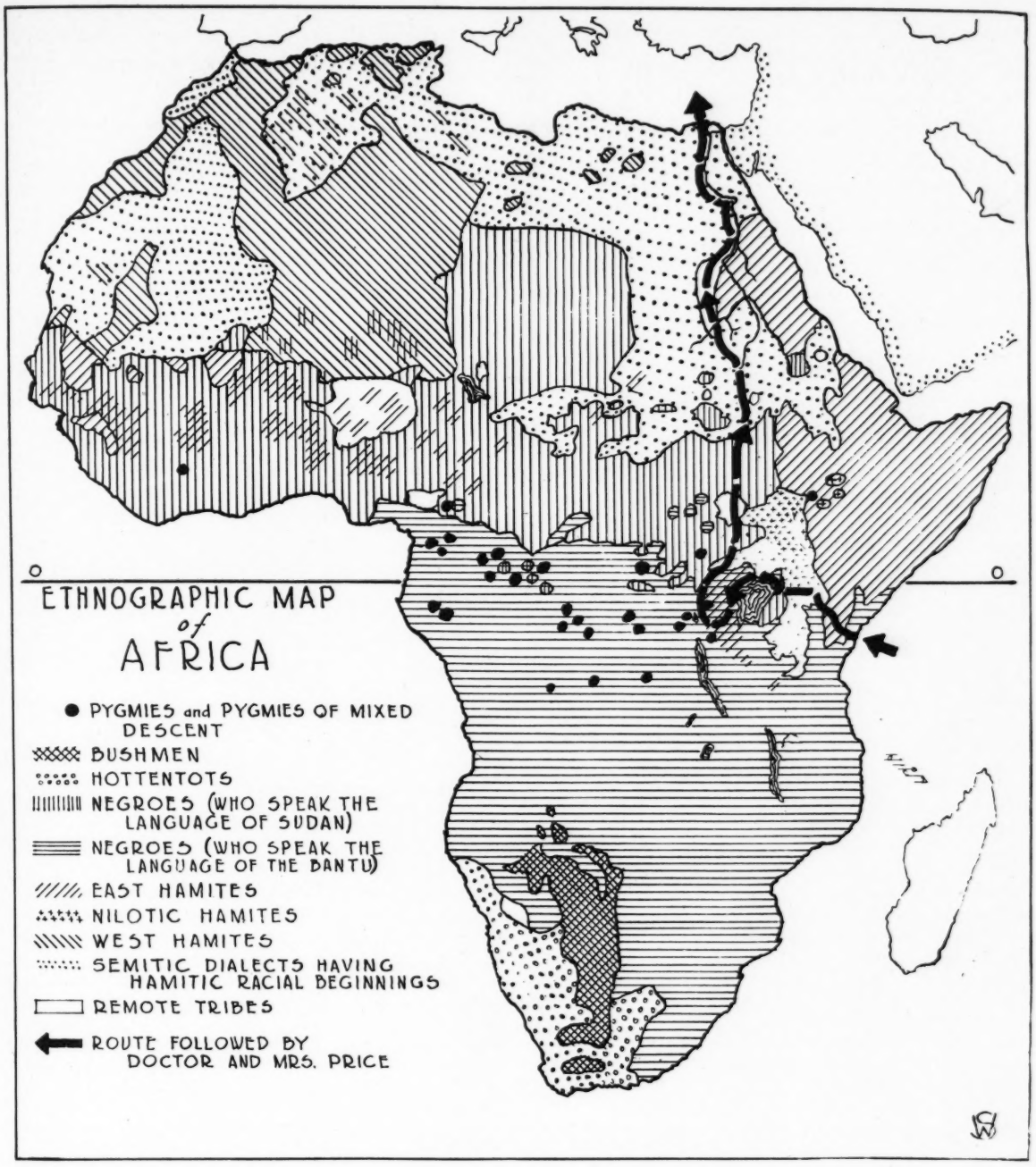
Because many of our degenerative processes, including dental caries, are so serious in all our modern civilizations, I have spent part of each year for several years in looking for and studying remnants of primitive racial stocks, in order to learn from them the secrets of their unique success. In order to find a standard of excellence when studying the change in environment of the members of a racial stock that had lost immunity, it was necessary to find large groups of people with high immunity to dental caries. The inhabitants of Alaska, northern Canada, the South Sea Islands, and the original Indians of North America who were studied lived in different and unique environments. It seemed important to include in these investigations also, a study of the accumulated wisdom of the primitives of central and eastern Africa. This was done during the summer of 1935. Our route took Mrs. Price and me (Mrs. Price accompanies and assists in making the records) through the Red Sea and down the Indian Ocean to enter the African continent at Mombasa below the Equator; then across Kenya and Uganda into eastern Belgian Congo, and thence about four thousand miles down the long stretch of the Nile through Sudan to the modernized civilization of Egypt. This journey took us all around Ethiopia and gave us an opportunity to see several of the most primitive racial stocks of that country. These people are accordingly the neighbors of the Abyssinians or Ethiopians. Since these various tribes speak different languages and are under different governments, we had to organize our safari in connection with the local government officials in the different districts.

These journeys within Africa covered about six thousand miles. We observed about thirty different tribes. Special attention was given to the foods, samples of which were obtained for chemical analysis. More than twenty-five hundred negatives were made and developed in the field. If any one impression, which grew out of our experiences, were to be selected as being particularly vivid, it would be the contrast between the health and ruggedness of the primitives in general and that of the foreigners who have entered their country. That their superior ruggedness was not racial is evidenced by the fact that they lost their superb physical excellence and freedom from the degenerative processes when they became modernized through their association with modern civilizations. Few Europeans of the many whom we encountered who had been in central Africa for as much as two years had not been seriously ill. Many showed distinct evidence of physical breakdown and stress. That it was not the severity of the climate of the various districts, but something that related to the methods of living, was soon apparent. In all districts, it was recognized and expected that the foreigners must plan to spend a part of every few years or of every year outside that environment if they would keep well. Children born in that country to Europeans were generally expected to spend several of their growing years in Europe or America if they were to build even relatively normal bodies.

Dangers From Disease

The most exacting condition of the environment that we encountered was the constant exposure to disease. Dysentery epidemics were so severe and frequent that we scarcely allowed ourselves to eat any food that had not been cooked or that we had not peeled ourselves. In general all drinking water had to be boiled. We did not dare let our bare feet touch a floor or the ground for fear of jiggers which burrow into the skin of the feet where they lay their eggs and hatch their broods under festering sores. Below six thousand feet above sea level, it is scarcely ever safe, after sundown, to step from behind a mosquito netting or to go out without thorough protection against the malaria pests. These malaria mosquitoes which include many varieties are largely night feeders. They were thought to come out soon after sundown. We were advised that public eating places were the most dangerous. These mosquitoes hide under the tables and attack the diner's ankles if he is not adequately protected, a precaution which we rigidly followed. Disease-carrying ticks were so abundant in the grass and shrubbery that we had constantly to be on guard to remove these from our clothing, so that they would not bury

[1] Price, W. A.: Why Dental Caries with Modern Civilizations? DENTAL DIGEST, March to August, 1933; February to July except May, 1934; May and June, 1935.



themselves into our flesh. They were often carriers of severe fevers. We had to be extremely careful not to touch the hides with which the natives protect their bodies (from the cold at night and from the sun in the daytime) without thorough sterilization of our hands following it, because of the lice that infested the hair of the hides. We did not dare to enter several districts because of the dreaded tsetse fly and the sleeping sickness it carries. One wonders at the apparent health of the natives until he learns of the unique immunity they have developed, which is largely transmitted to the offspring. In several districts we were told that almost every living native had had typhus fever and was immune, although the lice from their bodies could transmit the disease. One also wonders why people with such resistance to disease would not be able to combat all the degenerative diseases of modern civilization. Strange as it may seem when they adopt something from modern civilization, they then become susceptible to several of our modern degenerative processes.

Doctor Anderson who is in charge of a splendid government hospital in Kenya assured me that in several years of service among the primitive people of that district he had observed that they did not suffer from appendicitis, gallbladder disorders, cystitis, or duodenal ulcer.

I have already presented a preliminary report on the incidence of dental caries among these African tribes at the November meeting of the American Dental Association at New Orleans which will be published in the *Journal* of that Associa-

tion. It is significant, as that report discloses, that we studied six tribes in which I did not find a single tooth that had been attacked by dental caries, nor a single malformed dental arch. Several other tribes were found with nearly complete immunity to dental caries. Where the members of the same tribes had adopted something from modern civilization, many cases of tooth decay were found. In the next generation following the adoption of the European dietaries, dental arch deformities developed.

Racial Origins

We are concerned to know something of the origin of these people, including the Ethiopians, and to what extent racial ancestry has protected them. If we refer to an ethnographic map of African races, we find there is evidence of a movement northward from South Africa. This includes several tribes that are grouped together as Bantu. They had some things in common with the Melanesians and Polynesians of the South Pacific whom we studied the year previously. Their language carries some words of similar meaning. While there are many tribes existing today of apparently Bantu origin, it is of interest and evident significance that they each carry some identifying characteristics of language, dress, and food habits. Another racial movement has apparently moved southward from northern Africa. These tribes are of Hamitic origin and include the Nilotic Tribes and Abyssinians. The Nilotic tribes have a distinct physical pattern and mode of life. These racial movements have met in the Upper Nile region of eastern Africa near the Equator, and have swayed back and forth with successive obliteration or absorption of those tribes that were least sturdy. The Negro race occupied an area across Africa from the West to Central Africa. They were exposed to the aggression and oppression of these two great racial movements, resulting often in intermingling in various proportions of racial bloods. The Semitic race, chiefly Arabs, occupied Arabia and a large area in northern Africa.

In this bird's eye view, we observe changes that have been in progress during many hundreds of years. The Arabs have been the principal slave dealers working in from the east coast of Africa. They have maintained their individuality without much blending except on the coast. They have not become an important part of the native stock of the interior. These primitive native stocks can be largely identified on the basis of their habits and methods of living. The Nilotic tribes have been chiefly herders of cattle and goats, and have lived primarily on dairy products, including milk, and blood with some meat, and a varying percentage of vegetable foods. It was interesting to observe that in every instance these cattle people dominated the surrounding tribes. They were characterized by superb physical development, bravery, and a superior intelligence that made it possible for them to dominate. Among these Nilotic tribes the Masai forced their way farthest south and now occupy a position between two of the largest Bantu tribes, the Kikuyu and the Wakamba. Both of these latter tribes are primarily agricultural people.

The Masai Tribe

It is interesting to study the methods of living and observe the wisdom of the Masai. They are reported to have known for more than two hundred years that malaria was carried by mosquitoes. Further, it is reported that they have practiced exposing the members of their tribes who had been infected with syphilis by the Arabs to malaria in order to prevent the serious injuries resulting from that spirochetal infection. Modern medicine boasts of discovering this principle of using malaria to prevent or relieve syphilitic infections of the spinal cord and brain.

I saw the natives making skilfull operations on their cattle. They had no currency and made all their transactions with cows or goats. A valuable cow was not eating properly, and I observed a native take a thorn out of the inside of her mouth. The surgical operation was made with a primitive knife, made by smelting iron, tempered by pounding. The wound was treated by rubbing into it the ashes of a plant that acted as a powerful stiptic. The native Masai's knowledge of veterinary science is remarkable. I saw them treating a young cow that had failed to conceive. They apparently knew the cause and proceeded to treat her as modern veterinarians might do in order to overcome her difficulties. Native food throughout the centuries has depended largely on milk, meat, and blood, with a reinforced diet of vegetables and fruits. The natives milk the cows daily and bleed the steers at regular intervals by a unique process. In Fig. 1 a native Masai is shown with his bow and arrow, the latter tipped with a sharp knife which is guarded by a shoulder to determine the depth to which the arrow may enter. If the animal is sufficiently tame the blood is drawn while it is standing as shown in Fig. 2. If the animal is frightened, it is quickly hobbled as shown in Fig. 3. In Fig. 3 the stream of blood is seen spurting from the jugular vein into a gallon-sized gourd. A torque is placed around the neck before the puncture is made. The animals did not even flinch when struck by the arrow because the operation is done so quickly and skilfully. When sufficient blood was drawn the torque was removed and the blood immediately stopped flowing. A stiptic of ashes was used. This also protects the wound from infection. The blood is defibrinated by whipping in the gourd as shown in Fig. 4. The fibrin is fried or cooked in the manner that bacon or meat is prepared. The defibrinated blood is used raw just as the milk is except in smaller quantities. When available, each growing child receives a day's ration of blood as does each pregnant or lactating woman. Formerly, the warriors used only this food. These three sources, milk, blood, and meat, provide the natives with liberal supplies of body-building minerals and the special vitamins, both fat-soluble and water-soluble. Their estimate of a desirable dairy stock is based on quality not quantity. They judge the value of a cow and whether it should be kept in their herd by the length of time it takes for her calf to stand on its feet and run after it is born, which is only a few minutes. This is in striking contrast with the practice of our modern dairymen who are chiefly concerned with the quantity of milk and quantity of butterfat rather than with its value as a source of special factors for nutrition. Many of the calves of the modern high production cows of civilized countries are not able to stand for many hours after birth, frequently twenty-four. This factor is also im-

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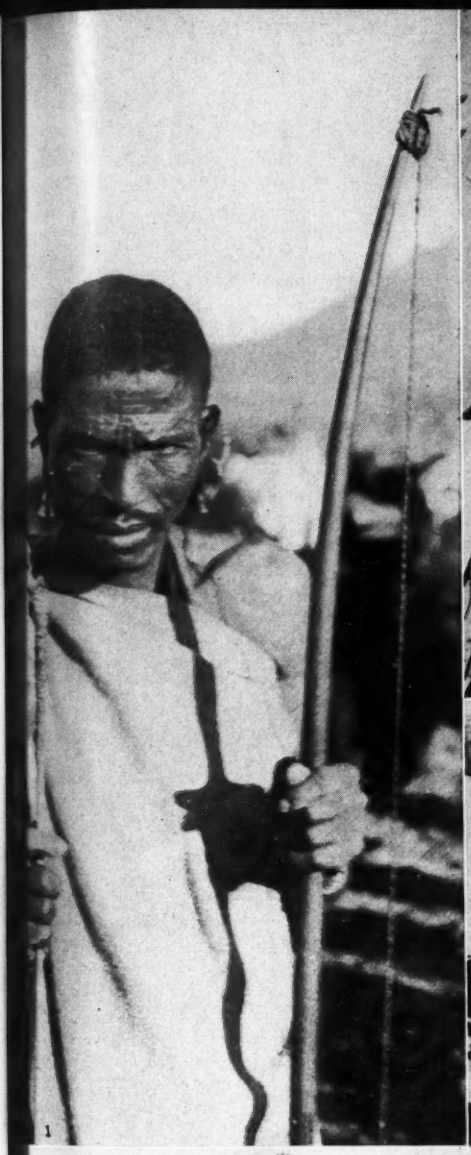
Fig. 1—Blood is drawn from the jugular vein of the steers with this lancet-tipped arrow.

Fig. 2—If the animal is tame it remains standing. The blood-letting operation is almost painless.

Fig. 3—If the animal is wild, it is hobbled as shown. Note the blood spurting into the gourd.

Fig. 4—The blood is defibrinated by whipping in the gourd as shown.

Fig. 5—Typical scene within a manyata. The huts are covered with a mixture of clay and cow dung. In the rainy season they are covered with hides.



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3

portant in a country infested with predatory animals, such as lions, leopards, hyenas, jackals, and vultures.

This reminded me of my experience in Alaska in studying the reindeer of the Eskimos. I was advised that a reindeer calf could be dropped in a foot of snow and almost immediately it could run with such speed that the predatory animals could not catch it. I was also advised that these fawns would go almost immediately after birth with a herd on a stampede and never be knocked down.

The problem of combating the predatory animals, particularly the lions, calls for great skill and bravery. The lions live on the large grazing animals and are particularly fond of cattle. They do not select the weaklings. In driving over the veldt we frequently saw one or two men or boys guarding, with only their spears, an entire herd from predatory animals. Their skill in killing a lion with a spear is one of the most superb of human achievements. I was deeply interested in learning that they prefer their locally-made spears to those that are manufactured o u t s i d e, because of their certainty that they will not break and will withstand straightening, regardless of how much they are bent and because of the sharp edge that they take by the native process of manufacture.

On one occasion, after we had been kept awake most of the night by the roaring of the lions and neighing of the zebras that were being stalked by the lions, we were interested when we visited a Masai manyata nearby to find that when they let their cattle and goats out of the corral built of acacia thorns, three or four spearsmen went ahead of the stock in search of the lions that might be waiting to ambush their cattle. They apparently did not have the slightest fear. The lions evidently had made a kill nearby. This the natives determined by the number of coyotes.

The courage of these people has been largely broken by the action of the government in taking away their shields in order to prevent their pillaging the surrounding native tribes. They have depended on their shields, to protect them from the arrows of the other tribes. The efforts to make agriculturists of these people are not promising.

A typical scene within a manyata is presented in Fig. 5. This chief has eight wives. Each one has her separate dwelling; several dwellings can be seen. Timber and shrubbery are so scarce in this vicinity that the dwellings are built of clay mixed with cow dung which is plastered over a framework of twigs. This chief is over 6 feet in height.

(End of First Installment)

Dental Research Laboratories
8926 Euclid Avenue.

A NEW AND EFFECTIVE MEANS FOR DENTINE DESENSITIZATION

(Continued from page 45)

the time of anesthesia was considerably shortened. About twenty minutes of anesthesia was the average.

2. The only area that was desensitized was directly surrounding the application. Cutting into other parts of the tooth would expose sensitive dentine.

3. The pulp was not involved in the application and would respond to a too vigorous use of the bur or any thermal and electrical tests. It was possible to cut right down and expose the pulp without pain, but the pulp would respond to the slightest pressure on touching it.

Several attempts were made to anesthetize the pulp for pulp removal, but they were unsuccessful. Only the surface was anesthetized.

4. Many patients whose teeth had been trimmed down for crowns returned days later for the impressions or the fitting of crowns. The dentine was found to be sensitive even to the touch of a pellet of cotton. By merely swabbing these prepared teeth for one-half minute, it was found possible to proceed without discomfort to the patient.

5. It was early recognized that if phenol had been recently used in a cavity this solution would be ineffectual.

6. Of the more than 500 applications made the results in only a few cases could not be considered ideal.

(a) The evident reason for one failure was not recognized until the day following the application when it was discovered that owing to the evaporation of the ether there was a crystal formation on the bottom of the bottle. It was no longer a balanced solution. A fresh solution used on the same patient was effective.

(b) Several patients complained of a burning sensation on the tongue, when the solution had been swabbed freely around some of the lower molars. In the case of such an accident a solution of sodium bicarbonate used immediately as a mouth wash seemed to give relief.

(c) Five patients had a lifting of the mucous membrane under cotton rolls, where cotton rolls were used for isolation of the teeth. If the cotton rolls had been changed immediately after the application, this might not have happened. When the rubber dam has been used for the isolation of the teeth to be worked on, this has never happened.

7. As a result of my observations I have developed the greatest respect for the dental pulp. Instead of being a delicate part of the tooth it has proved hardy and able to stand all the abuses to which it is subjected. I am convinced that many of the sensations that we thought originated in the pulp do not really do so. They originate in the dentine instead.

8. Many cases of so-called pulpitis have been relieved by a single application of my desensitizer; a cement base placed in the cavity, and the restoration of the tooth.

9. About a year from now I should like to report the results of some of these cases which up to date present all the clinical reactions of normal pulps. The results have been so gratifying that I have every expectation of saving many teeth which otherwise would have to be extracted or in which the pulps would have to be removed.

10. New fields for research lie before us and much more work is yet to be done. I should like to ask the dental profession to assist me in compiling data which will prove of value to all of us.

630 West One Hundred and Sixty-Eighth Street.

The Editor's Page

IN determining the efficacy of any medicament, or any procedure or technique used in the treatment of disease or the alleviation of pain, it is necessary that the cold light of the scientific method be applied. At the present time the desensitizing method described by Doctor Leroy L. Hartman is receiving widespread attention. To apply scientific criteria to this agent, several conditions are essential: (1) Anyone who uses the preparation must understand the physiologic and biochemical theory on which it is based; (2) controlled experimentation should be conducted over a reasonable period of time to gather any possible demonstrable objective evidence regarding the effects on the dental pulp; (3) accurate records and case histories should be kept describing the results of the use of this preparation under varying clinical conditions. Case reports are, of course, only of value when they relate observable objective facts rather than subjective impressions.

The momentary enthusiasm of the dentist or his patient for a new technique or treatment does not possess the essential quality of the "test of time," which is, in the final analysis, the only proof, and the proof for which we must wait. When and if that scientific or at least empiric evidence is recorded, the hysteria of the present will have long subsided, and commendation will mean more if it follows after an established worth has displaced scientific skepticism.

The theory on which the Hartman formula is based is somewhat the same as the theory on which narcosis is explained. The three commonly accepted theories of general anesthesia (1. Overton-Meyer; 2. Moore-Roaf; 3. Verworn) are all based on the belief that anesthetics produce their action because they are soluble in lipoids. Because lipoids are present in the protoplasm of all nerve tissue and it is thought that they are present in the dental fibrils, the change in the chemical character of the lipoids by the application of the desensitizer is believed to produce the anesthesia; but the exact nature of this process is not understood.

Doctor Hartman believes that lipoids exist in the dental tubules. By a chemical change in the lipoids produced by drugs that are lipoid solvents (alcohol and ether), and by the use of a drug that is solvent in lipoids (thymol), he believes that the conductivity of nerve impulses is temporarily suspended.

With regard to controlled experimentation, we must point out that this preparation should be of an assured consistency; it should be used according to a standardized technique; and it must be tried under all conditions met in clinical practice.

It is common knowledge that the sensitivity of dentine is not necessarily in direct ratio to the amount of tooth structure that has been attacked by caries or even to the degree of extension toward the pulp. It is also well known that in clinical practice different types of caries are observed —from the slowly developing, hard, dark type to the more malignant form characterized by soft, leathery dentine. It seems important to know how the Hartman solution will affect these varying types of the carious process. It will be interesting to see published evidence of such observations in the future.

There is no accurate method of recording the response of different persons to the sensation incident to the dental experience. We are all aware that the unfavorable reaction incident to tooth excavation is of such a complex physiologic and psychologic nature, varying so much in different persons under the same and different conditions, that a scientific evaluation is extremely difficult, if not impossible. We are aware that morbid apprehension, group conditioning, juvenile fixations, and other psychologic states play their part in the reaction to the dental experience. It will take more than a first trial application of a local medicament to erase these attitudes.

The results to date of the use of this preparation vary from complete failure in the hands of some practitioners to a rather high percentage of success in the hands of others.

The test of time, we repeat, is the only method of proper evaluation of this or any other therapeutic agent. Doctor Hartman did not offer this formula as an immediate panacea. In his own words, in closing his discussion before the Chicago Dental Society, he said, "This has its limitations... For the treatment of sensitive dentine and cavity preparation and the simple preparation of crowns, you will find, if you use this intelligently, it will prove a boon."

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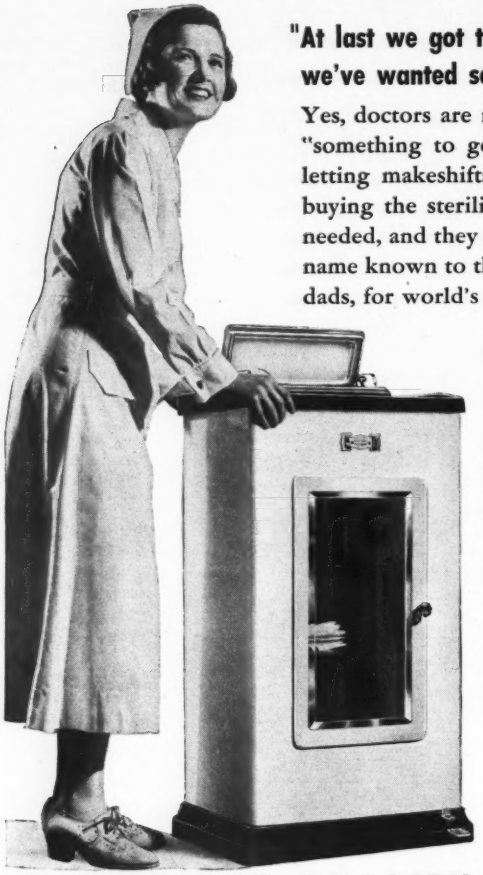

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FUNDAMENTAL DENTAL MODELS

(*Continued from page* 46)

a natural appearance. This third pair is intended for the demonstration of natural normal morphology, occlusion, and balanced articulation.

This model set shows the fundamental characteristics which are essential to the study of dental morphology, occlusion, and articulation—the basic elements of dentistry.

Demonstration Blocks for Interlocking, Occlusion, and Articulation

The close study of occlusion and interlocking is extremely difficult with natural dental arcades or with models of them, because of the complexity of the details of the triturating surfaces, which does not permit an understanding of the minute details of these major problems.

I believe that geometrically schematized models suffice for an easy explanation of the basic laws of occlusion and articulation, but I consider it necessary to have some enlarged blocks of bicuspids and molars to be able to demonstrate the problem of interlocking. For this reason, I carved large schematized blocks. The full models have the upper second molar with three cusps; the blocks have the second upper molars of the type with four cusps. Both characteristic natural types of second upper molars, with three and four cusps, are thus taken into consideration in the models.

Conclusion

The schematized models may be utilized for the following purposes:

1. *For dental anatomy*: as basic average models which are self-explanatory for tooth morphology.
2. *For physiology*: to explain the relation between morphology and function.
3. *For operative dentistry*: to explain the value of crests, depressions, grooves, and interlocking.
4. *For crowns and bridges*: to explain the value of balanced articulation.
5. *For prosthetic dentistry*: to explain the value of balanced articulation.
6. *For periodontia*: to explain the value of balanced articulation.
7. *For orthodontia*: as a basic example of normal dental arcades most suitable for purposes of comparison.
8. *For dental technique*: as ideal models for technical exercises: modeling, carving, partial dentures, and bridges.

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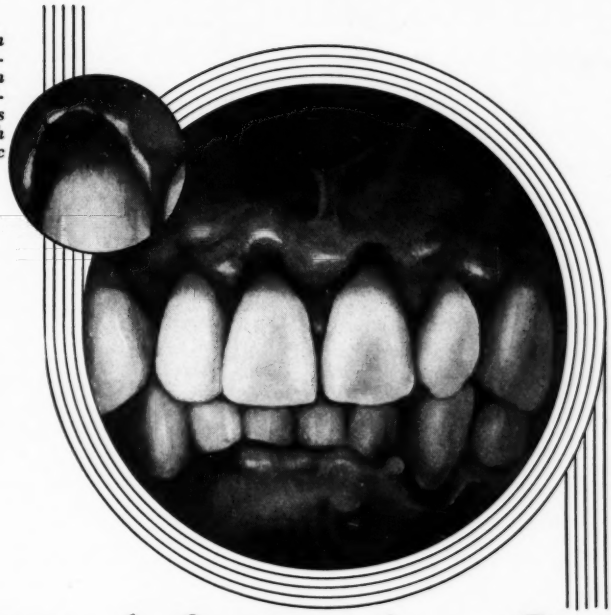

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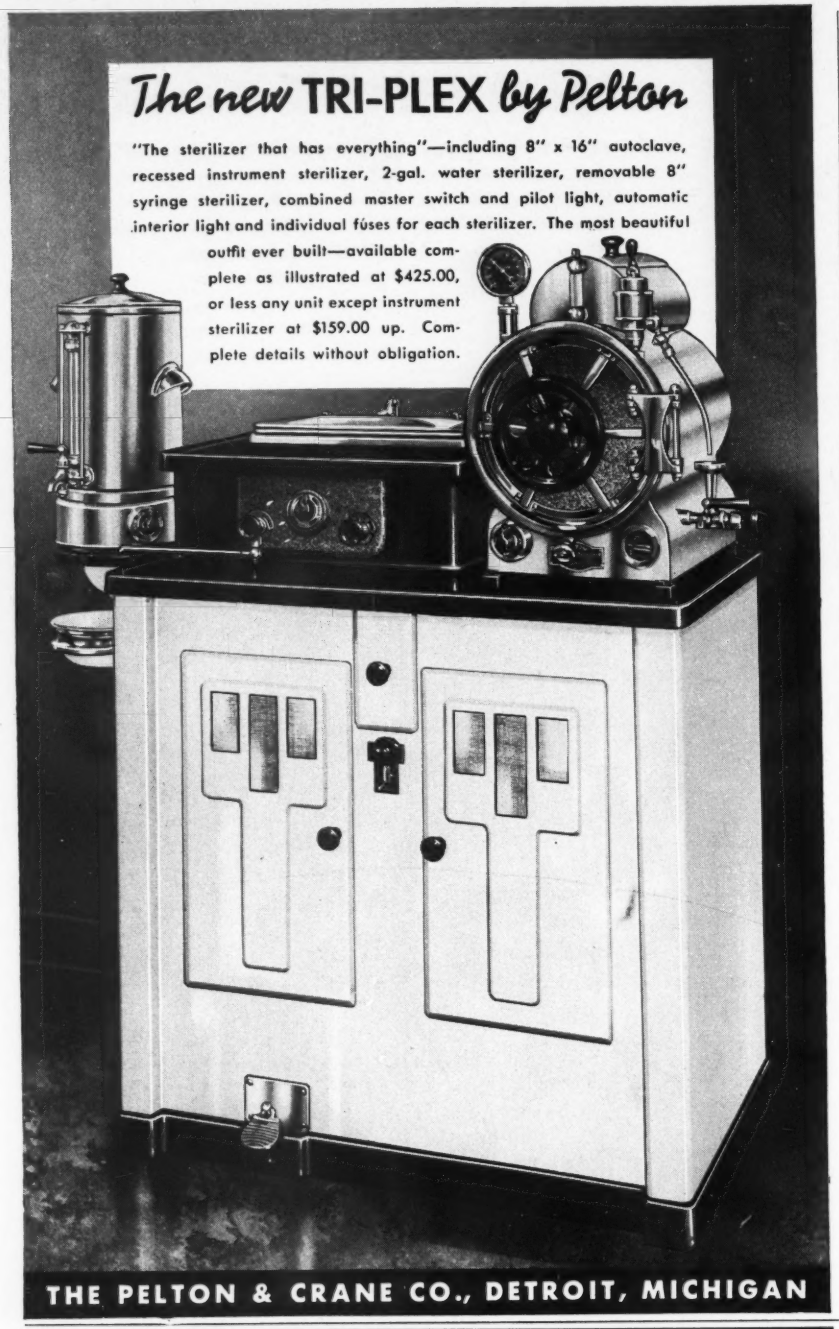
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"Thanks a lot for your New Year's remembrance. I noticed that you penned across the bottom of the card 'See you in San Francisco at the Convention.' That's good news, old man . . .

"I know you are going to like this city of ours, Harry. Let me know as soon as you can the date you will arrive, and whether Elsie will accompany you with the two boys. And, above all, try to arrange to stay a few days after the convention closes. I want to drive you up to Yosemite Valley for the Fourth of July. You'll love it up there in the High Sierra. The air is so confounded clear and bracing, you'll want to stay a week, just loafing . . . or playing a little golf, or taking some pleasant hikes. There's no end to the diversions in the National Park—and at night, when the fire-fall comes toppling over Glacier Point in a shower of sparks, you'll want to unlimber that tenor voice of yours and join in the community singing.

"But so much for that. Let me tell you something about San Francisco now. You'll get your first sight of the city as you cross the Bay on the ferryboat from Oakland. The skyline rises from the water's edge, and climbs the city's hills, culminating in lofty white, and pastel-tinted apartment houses. Straight ahead is high Twin Peaks, looking down on Market Street.

"Your boat will pass under the giant eight and one-quarter mile bridge that joins San Francisco with the East Bay. Sure, I know you've got bridges in New York; but, honestly, none like this one. It is the world's greatest, comprising three types of construction: suspension, a huge tunnel which pierces Yerba Buena Island in mid-Bay, and a series of cantilever spans stretching beyond to the East Bay.

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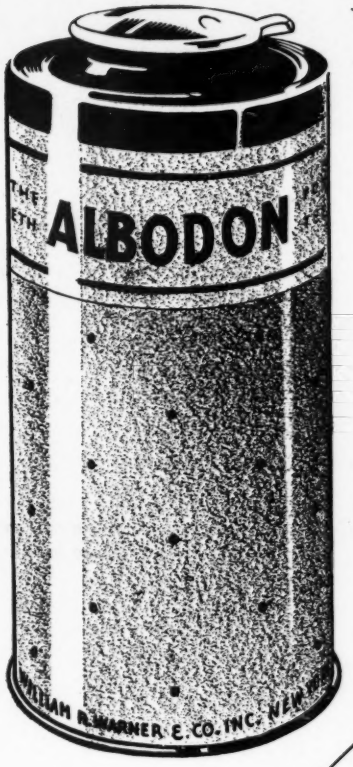

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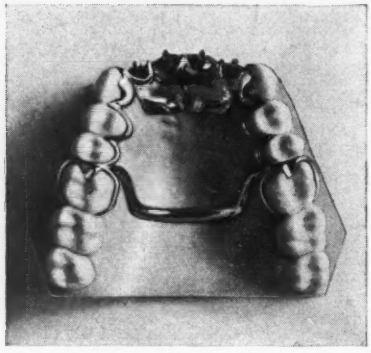
THE KEYSTONE OF GOLD SUCCESSFUL PRACTICE

PALINEY



Definite Economy — Established Safety

When your case is a partial denture which must be produced economically, PALINEY offers a highly satisfactory solution with GOLD. PALINEY takes advantage of recently discovered facts on alloying which make possible its low price and its extremely high tarnish resistance.

PALINEY 3 $1.15 per dwt.
PALINEY 4 1.45 per dwt.

THE J. M. NEY COMPANY
Est. 1812
HARTFORD, CONN. CHICAGO, ILL.

FLASKS ARE IMPORTANT

Guides are Renewable

The very fact that the Luxene technic calls for a special flask indicates that care should be exercised in selecting a flask for this work.

Our new No. 28 has been designed to meet every requirement of the Luxene technic, and we have also incorporated all of the features of good workmanship, good material and proper finish found in every flask we produce.

Removable guides are an outstanding feature of the No. 28 and permit replacement of these important parts when they become worn, thus insuring a perfect fit during the life of the flask.

Inside dimensions
2-15/16" x 3¾" x 1¾"
Price $4.25 in Buffalo Dental Bronze
(Why not send for our new Flask Booklet?)
(Use coupon on page 66)

BUFFALO DENTAL MFG. CO., KEHR & URBAN STS., BUFFALO, N.Y.

From my windows in the Four-Fifty Sutter Building, I can watch this activity, as men swarm over the catwalks.

"Probably you wouldn't believe me if I started raving about our *other* bridge—the one crossing the famous Golden Gate strait, and joining San Francisco with Marin County. That one holds a world's record, too. It will be the longest single suspension span ever erected, 4,200 feet of clear suspension. It will be completed early next year.

"You know, the air out here does something to a person. All during summer, breezes come in from the Pacific, tempering the sun's rays. To fire a statistic at you: San Francisco enjoys an *average* summer temperature of about 56 degrees. And while I'm talking about the weather, take my advice. Bring along a top-coat, and don't forget to tell Elsie and the boys to bring wraps and coats, for the evenings are invigorating—there are no hot, sultry spells at night.

"I'll wager that the first thing you ask me when you arrive is 'Where are all those swell restaurants San Francisco is noted for?' Well, you'll find any number of them. Spanish cafes, where the chefs prepare the choicest Castillian dishes . . . Basque restaurants, that would delight Ernest Hemingway . . . Japanese cafes, where we'll sit on soft mats on the floor and watch a dainty Oriental lass prepare a delicious meal before your eyes . . . quaint little candle-lighted inns on Russian and Telegraph Hills, overlooking the Bay with its flickering lights . . . and ever so many more.

"Remember the cook up at the Lake? I'll bet you have never forgotten the chopino he made for us one night. Where he ever got the fresh crabs for it, we'll never know; but was it a tasty dish! Well, I've found several places in San Francisco that serve chopino—tender and delicious, and with the spicy sauce. I'm eager to take you to a quiet little place on Grant Avenue, where we can enjoy this treat. And with it comes minestrone, the soup that the natives of Italy have made famous; salad, salami, and olives, ravioli, plenty of Italian bread, and a bottle of good wine. This dinner is going to be on me, and when the check arrives I assure you I won't go broke. It'll be fifty cents each!

"I'm going to set one day aside to show you San Francisco. We'll go through a *real* Chinatown, the largest

The best defense against caries is a strong offense by professional prophylaxis and lay care with toothbrush and scientific dentifrice.

•

SQUIBB DENTAL CREAM

The Priceless Ingredient of Every Product is the Honor and Integrity of its Maker

E. R. Squibb & Sons, Dental Department, 3202 Squibb Building, New York City.

Attached hereto is my professional card or letterhead. Please send me a complimentary package of Squibb Dental Cream.

Name_____

Address_____

(Or use coupon on page 67)

A Critical Point In Patient Contact

Everything going along nicely. The patient, outwardly at least, is calm—when a startled movement of the head and a tensing of the muscles manifests *pain*.

It may last only an instant. But that instant is long enough to have a lasting effect upon the patient's nervous system. Throughout the remainder of the operation the patient is tense, expectant, fearful every instant that the operation will cause a recurrence of the painful shock.

Pain control is of such vital importance in dentistry because pain leaves a lasting impression on patients' minds. Particularly is this true of cavity preparation. It is the fear of the bur—the irritating, nagging, nervous fear of being hurt—that, more than anything else, keeps patients out of dentists' offices.

There is a pleasant, economical and safe way of overcoming this fear—analgesia with the McKesson Nargraf or Euthesor.

Through the use of McKesson analgesia patients can be put entirely at ease. Nervous tension is eliminated. Disturbing, painful shocks are avoided. And the patient leaves the office undisturbed by painful memories—a good patient, who will have no apprehension about his next appointment.

Get the facts on McKesson analgesia equipment. The simplicity of operating this equipment will surprise you. You will also be agreeably surprised to learn of the small investment involved. The coupon on page 66 will bring you complete information.

McKESSON APPLIANCE CO.
TOLEDO, OHIO

in the world, outside of China. We'll explore the alleys off Grant Avenue, where the curliqued eaves on the buildings are typically Oriental. We'll look in on a Chinese herb shop . . . browse around in a quaint bazaar, where rare treasures from the Orient are on display . . . be escorted through a Chinese temple, or Joss House . . . visit the Chinese telephone exchange, the only one of its kind in America . . . meet Ching Wah Lee, a young University of California graduate, who will take us through his studio, crammed with Oriental treasures, and see other sights in this famous quarter.

"That night I'm going to take you to one of the Chinese theatres. Like as not the play will be in its fourth month. And by that I don't mean that each night the performance is repeated—it's the *same play*, and it might run on for a year before it's finished!

"You'll notice the lack of stage sets. When a change of scene is called for, a nonchalant stage-hand, in shirt-sleeves, stalks across the stage. If he pulls out a table from a wing and places a chair upon it, the astute Celestials in the audience will immediately know that the action is taking place on a second floor. If a character is to present his lines from the second floor, he will mount the table, sit on the chair, and speak his lines. A character, supposed to be on horseback, will ride a broomstick across the stage. Everything is highly impressionistic, and lines are presented in high-pitched sing-song voices.

"And you mustn't miss Fishermen's Wharf, where you'll see hundreds of little fishing smacks in the lagoon, waiting to put out to sea in search of San Francisco's supply of fresh seafood. Ride a street-car to the wharf, and get a thrill out of the tiny cable car as it runs up and down the steep downtown hills.

"Well, Harry, I guess I'm rambling on in my enthusiasm, but you'll understand how it is when you see San Francisco for yourself. I'm looking forward to June for a real get-together; so, until then, the best of luck to you, Elsie, and the boys.

"As ever, yours,
"Sanford M. Moose, D.D.S.,
San Francisco."

THE BALANCED CEMENT

NO AMOUNT of skill in the preparation of the cavity or in the application of dental cement can compensate for the lack of necessary properties in the cement itself. A lack of or a disproportion of all the necessary properties in the cement often betrays the skill of the dentist to the injury of his reputation. Ames Cement presents a product made to a perfectly balanced formula. These are the reasons why Ames Cement after almost 50 years still is the best known dental cement.

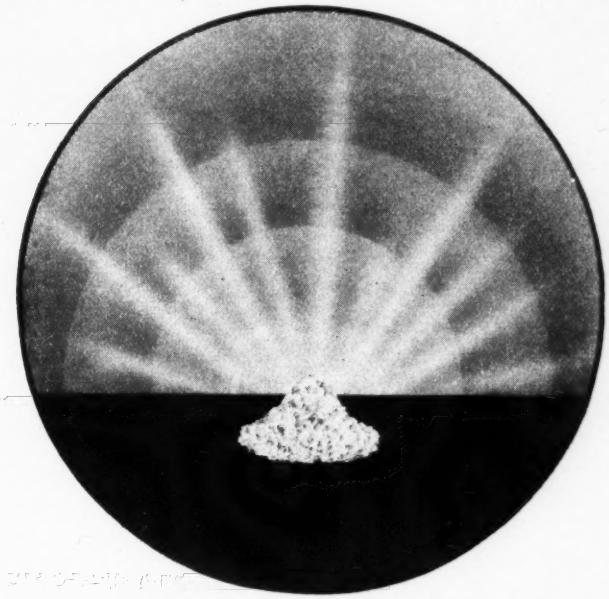
THE W. V-B. AMES COMPANY
Fremont, Ohio

Introducing Ames F Liquid

Our research laboratory has developed a new, fast-cutting cement liquid "F" for use with our regular Crown & Bridge Cement Powders. We still recommend our "C" liquid for general purposes. Some dentists prefer a faster-setting cement liquid and to those users we recommend the "F" liquid.

AMES DENTAL CEMENTS

No. 25 of a Series of Advertisements Prepared in the Interest of Acetanilid U. S. P. by the Emerson Drug Company



Maximum Analgesic Effect With Minimum Dose

ACETANILID

IN SYNERGISTIC COMBINATION

ACETANILID has demonstrated its outstanding value in the relief of pain. Many physicians choose it as their No. 1 analgesic. A great number of the profession prescribe acetanilid in combination with its synergists, caffeine and bromides . . . for more rapid action . . . and for maximum effect with minimum dose.

- The relative non-toxicity of acetanilid has been frequently cited in the literature. The lower dose required when it is used with caffeine and bromides makes acetanilid doubly safe.

- Acetanilid acts to relieve pain by blocking the synapses and preventing the pain impulses from reaching the higher centres. A scientifically proportioned combination containing acetanilid with caffeine and bromides may now be had in an inexpensive, effervescent pharmaceutical. Citrates add zest and valuable alkalinization.

EMERSON DRUG COMPANY

BALTIMORE • MARYLAND

Generous trial supply and literature sent upon request

(Please use coupon on page 67)

See second cover D.D.2

GENERAL ELECTRIC X-RAY CORP.
2012 JACKSON BLVD., CHICAGO, ILL.

Send complete details concerning the G-E Micro-Surgical Unit. Also instruction class information.

Dr. .....

Address .....

City .....

See page 37 D.D.2

WERNET DENTAL MFG. CO.
882 THIRD AVENUE, BROOKLYN, N. Y.

Send free supply of Wernet's Powder as mentioned in ad. Enclosed is my card or letterhead.

Dr. .....

Address .....

City .....

See page 40 D.D.2

WEBER DENTAL MFG. CO.
CANTON, OHIO

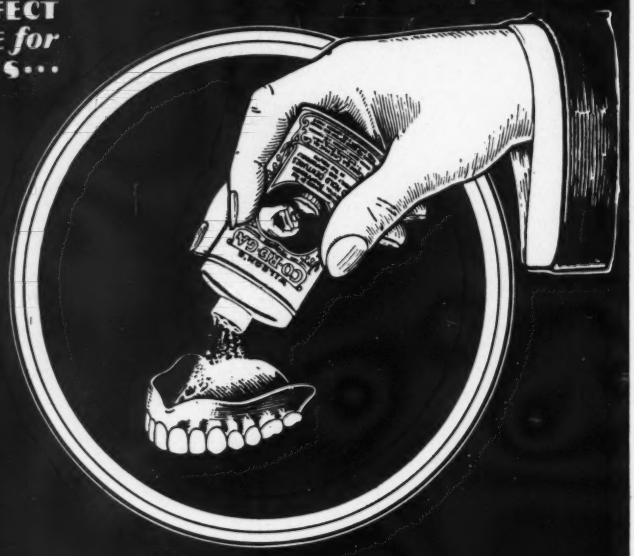
Please send complete details concerning the new Weber Model 5 X-Ray.

Dr. .....

Address .....

Dealer .....

WILSON'S
CO-RE-GA
(POWDERED)
THE PERFECT ADHESIVE *for* DENTURES···



« « « Nothing excels the proved effectiveness of CO-RE-GA in helping patients overcome the first inhibitions of artificial dentures » » » » »

PLEASE SEND FREE SAMPLES FOR PATIENTS
DR. .....
COREGA CHEMICAL CO.
205 ST. CLAIR AVE. N.W.
CLEVELAND OHIO, U.S.A.
This coupon is for dentists use only

MAIL COUPON FOR YOUR SUPPLY

CO-RE-GA is not advertised to the public.

See page 58 D.D.2

WILMOT CASTLE COMPANY
1109 UNIVERSITY AVE., ROCHESTER, N. Y.

Send book "Modern Sterilization" mentioned in ad.

Dr. .....

Address .....

Dealer .....

See page 59 D.D.2

BRISTOL-MYERS COMPANY
19 WEST 50TH STREET, NEW YORK CITY

Send literature and clinical supply of Sal Hepatica please.

Dr. .....

Street & No. .....

City ..... State .....

See page 60 D.D.2

PELTON & CRANE COMPANY
632 HARPER AVENUE, DETROIT, MICH.

Send complete details concerning the new Pelton Tri-Plex.

Dr. .....

Address .....

Dealer .....

See page 62 D.D.2

BUFFALO DENTAL MFG. CO.
KEHR & URBAN STS., BUFFALO, N. Y.

Please send new Flask Booklet mentioned in ad.

Dr. .....

Address .....

Dealer .....

See page 64 D.D.2

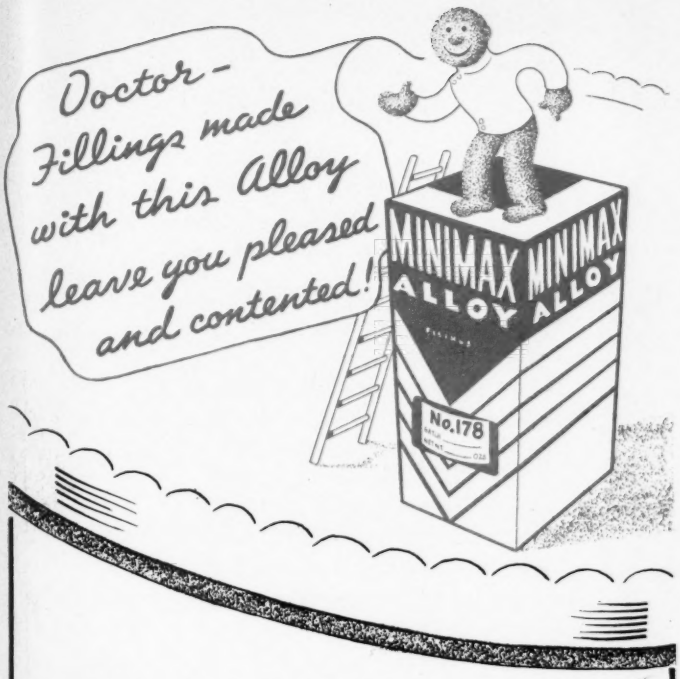
MCKESSON APPLIANCE CO., TOLEDO, OHIO

Please send complete information concerning McKesson Analgesia Equipment.

Dr. .....

Address .....

Dealer .....



You have a serene feeling of work well done when you have used Minimax Alloy No. 178 ... *because* Minimax is fabricated to give you freedom from vexing alloy faults and failures. It's made to meet all amalgam alloy specifications in *tests* AND *practice*!

That's why Minimax is so completely dependable . . . that's why it will work and react in your hands just as you expect it to. With a supply of Minimax in the office you can always have that assurance of success and security that comes from a product well made.

The MINIMAX COMPANY
Medical & Dental Arts Bldg., Chicago, Ill.

Minimax

You Get More

Filings suitable for alloy-mercury gauges.
Complies with Revised (1934) A.D.A. Specifications No. 1.

—You Pay Less

1 oz. bottle $1.80
5 oz. bottle . . . $1.70 per oz.
10 ozs. . . . . $1.60 per oz.
20 ozs. . . . . $1.55 per oz.

See page 63 D.D.2

E. R. Squibb & Sons, Dental Dept.
3202 Squibb Building, New York City

Attached hereto is my professional card or letterhead. Please send me complimentary package of Squibb Dental Cream.

Dr. .....

Address .....

City .....

See page 65 D.D.2

Emerson Drug Company
Baltimore, Md.

Please send trial supply and literature mentioned in ad.

Dr. .....

Address .....

City .....

See page 68 D.D.2

Vince Laboratories, Inc.
121 West 18th Street, New York City

Please send literature and trial supply of Vince.

Dr. .....

Address .....

City .....

See back cover D.D.2

Dentists' Supply Company
220 West 42nd Street, New York City

Please send technic and mould book as mentioned in ad.

Dr. .....

Address .....

City .....

NEURALGIA · MIGRAINE · POST-EXTRACTION PAIN

The Latest Advance in Dental Analgesia

LARODON 'ROCHE'

Prescribe one or two tablets of Larodon 'Roche' to be taken after extraction or other dental work. Larodon relieves pain quickly—only a few minutes elapse before the patient is aware of gratifying liberation from nerve-racking post-operative pain. The nervous system is soothed, and the patient obtains much-needed rest and recuperation.

For the treatment of migraine, neuralgia, and nerve pains in the region of the head and face, the following prescription has been found highly efficacious.

℞ Extract Cannabis Indica gr. iii
Larodon 'Roche' ℥ iss
Quinin Hydrobromide gr. xx
M. ft. caps. No. xx
Sig: One q. 2 h. or p. r. n.

PACKAGES. Larodon 'Roche' is issued in 5-grain tablets, boxes of 10 and bottles of 100, and in powder form, in 1-ounce cartons for extemporaneous prescriptions.

Prescribe LARODON in place of acetylsalicylic acid. LARODON is more effective and it is kinder to the stomach.

HOFFMANN-LA ROCHE · INC · NUTLEY · N. J.

VINCE AS A MOUTHWASH

Dissolved in a glass of water, a teaspoonful of Vince makes a refreshing, antiseptic, alkaline mouthwash and gargle. Moisture quickly releases nascent oxygen from Vince and renders it destructive to germ existence, without damage to the oral tissues. Being alkaline in reaction, Vince neutralizes the acid condition of the oral cavity, making it an unsuitable ground for the micro-organisms which thrive in such medium. It liquefies tenacious secretions; it cleans and deodorizes.

VINCE

Vince is recognized as a specific in the treatment of Vincent's and other types of oral infection. It is equally efficient against aerobic and anaerobic organisms. Well-suited for office treatment, as an easily prepared paste, and for home treatment as a dentifrice, mouthwash and gargle. Dental plates and other dental appliances are easily cleansed with Vince and may be kept immersed in a solution of Vince overnight.

Literature and a trial supply gladly sent upon request.

VINCE AS A TOOTHPOWDER

VINCE LABORATORIES, Inc., 121 West 18th Street, New York City

(Please use coupon on page 67)

Printed in U. S. A.

IT'S PRESSURE PACKED

WHAT PRESSURE PACKING MEANS TO YOU

Casting Investments are made up of ingredients varying in grain shape, particle size and specific gravity. These ingredients are carefully blended to form a homogeneous mixture of definite physical properties which must be maintained for performance at maximum efficiency.

During shipping and handling between manufacturer and consumer, the heavier particles settle and the lighter grains move upward, thus offsetting all the care exercised by the manufacturer in mixing. PRESSURE-PACKING is the ONLY WAY, so far discovered, for preventing this segregation of ingredients.

Steele's Super Investment

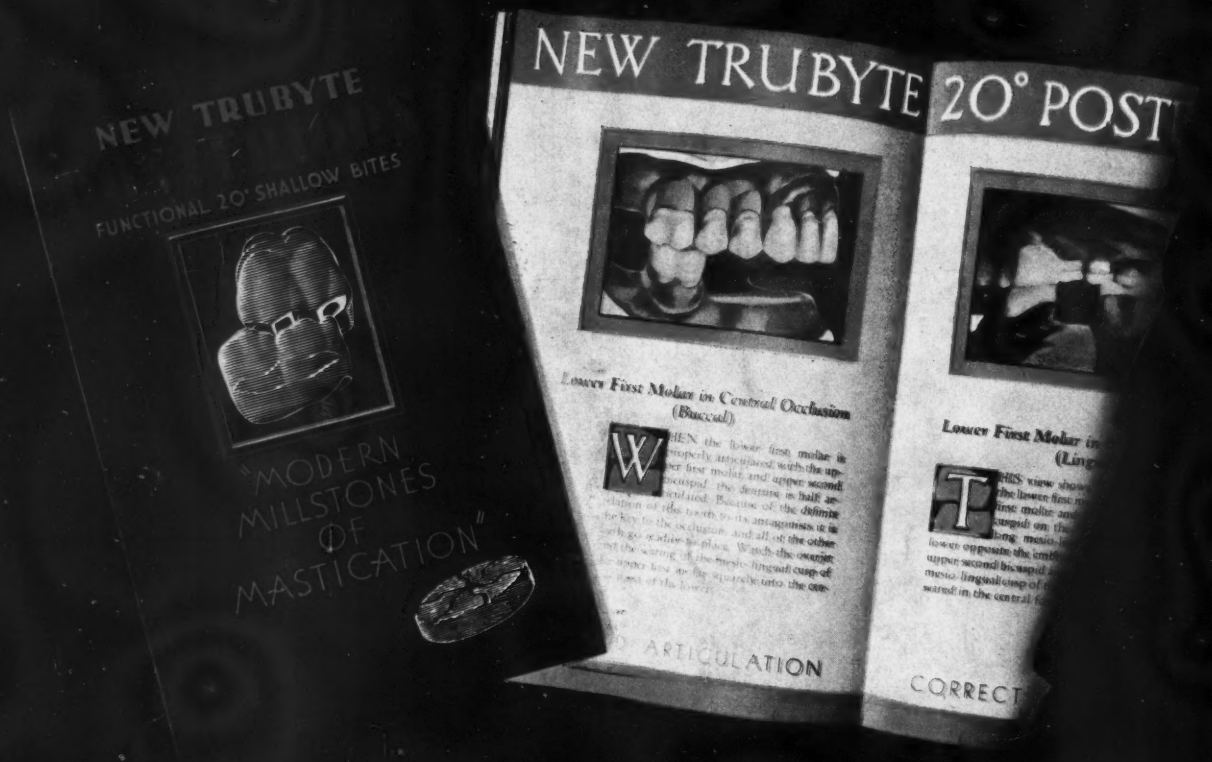
Is The ONLY Investment

Packed under Pressure

(PATENTED)

THE COLUMBUS DENTAL MFG. CO. Columbus, Ohio, U.S.A.

NEW TRUBYTE 20° POSTERIORS



"Just what we've been waiting for!"

DESCRIBES THE NEW ARTICULATION OF THE NEW TRUBYTE 20° POSTERIORS

THE NEW ANATOMIC AND MOLDS BOOK WILL BE SENT ON REQUEST

THE DENTISTS' SUPPLY COMPANY OF NEW YORK